DUBOVAYA-GOLOSARSKAYA, T.Ye. (Odessa)

First Russian periodical on roentgenology. Vrach.delo no.12:1357 D '57. (MIRA 11:2)

1. Pervaya kafedra rentgenologii i meditsinskoy radiologii (zav. - zasl. deyatel' nauki prof. S.A.Reynberg) TSentral'nogo instituta usovershenstvovaniya vrachey i kafedra istorii meditsiny (zav. - dots. F.F.Burlakov) Odesskogo meditsinskogo instituta
(RADIOLOGY--PERIODICALS)

POPOVA, A.I.; DUBOVAYA-GOLOSARSKAYA, T.Ye.

Effect of x-ray therapy of malignant tumors on the heart muscle according to electrocardiographic data. Kaz. med. zhur. no.5:25-27 S-O '61. (MIRA 15:3)

1. Odesskaya basseynovaya bol'nitsa moryakov Chernomorsko Azovskogo vodnogo otdela zdravookhraneniya (nachal'nik - Ye.S. Podurets).

(HEART--MUSCLE)
(CANCER)
(X RAYS--PHYSIOLOGICAL EFFECT)

DUBOVENKO, A., insh.; FEDOROV, V., insh.; TURCHANNIKOV, I., inzh.; KIZHNER, Yu., insh.; OBUKHOV, N., insh.; ANTONOVA, G., insh.; AVTIFENKO, I., insh.

An-2M. Grazhd. av. 22 no.12:11-14 D '65. (MIRA 18:12)

Dubovenko, E.

KLIMENKO, Grigoriy Afanas'yevich; DUBOVENKO, E., red.; DERMV'YANKO, G., tekhn.red.

[Lenin's ideas for electrification are realized]. Leninsʻki ideï elektryfikatsiï peretvoriuiut'sia v zhuttia. Kyiv, Derzh.vyd-vo polit. lit-ry URSR, 1957. 120 p. (MIRA 11:2)
(Electrification)

OGORODNIK, Savva Yakovlevich [Ohorodnik, S.IA.]; DUBOVENKO, E.[Dubovenko,IE.], red.; LIVEN', A., tekhn. red.

[Everything for the welfare of the people] Vse dlia blaha narodu. Kyiv, Derzh. vyd-vo polit.lit-ry URSR, 1961. 43 p. (MIRA 15:1)

(Cost and standard of living)

L 24808-66 EWT(d)/EWT(l)/EWT(m)/EWP(h) RO

ACC NR

Engineer

TITLE: An-2M agricultural aircraft

SOURCE: Grazhdanskaya aviatsiya, no. 12, 1965, 11-14

agricultural machinery, aircraft, An-2M aircraft

comprehensive composite article describing

electrical equipment, a new propeller, and many other changes. and replacement (An-2M) equipment ... along with conditioning equipment and characteristics. Chemical spraying and dispersion equipment is described in detail. Orig. art. has: 6 figures and 1 table. [LB]

SUB CODE: 02, 01/ SUBM DATE: none

Card 1/1

[illegible], L. I.

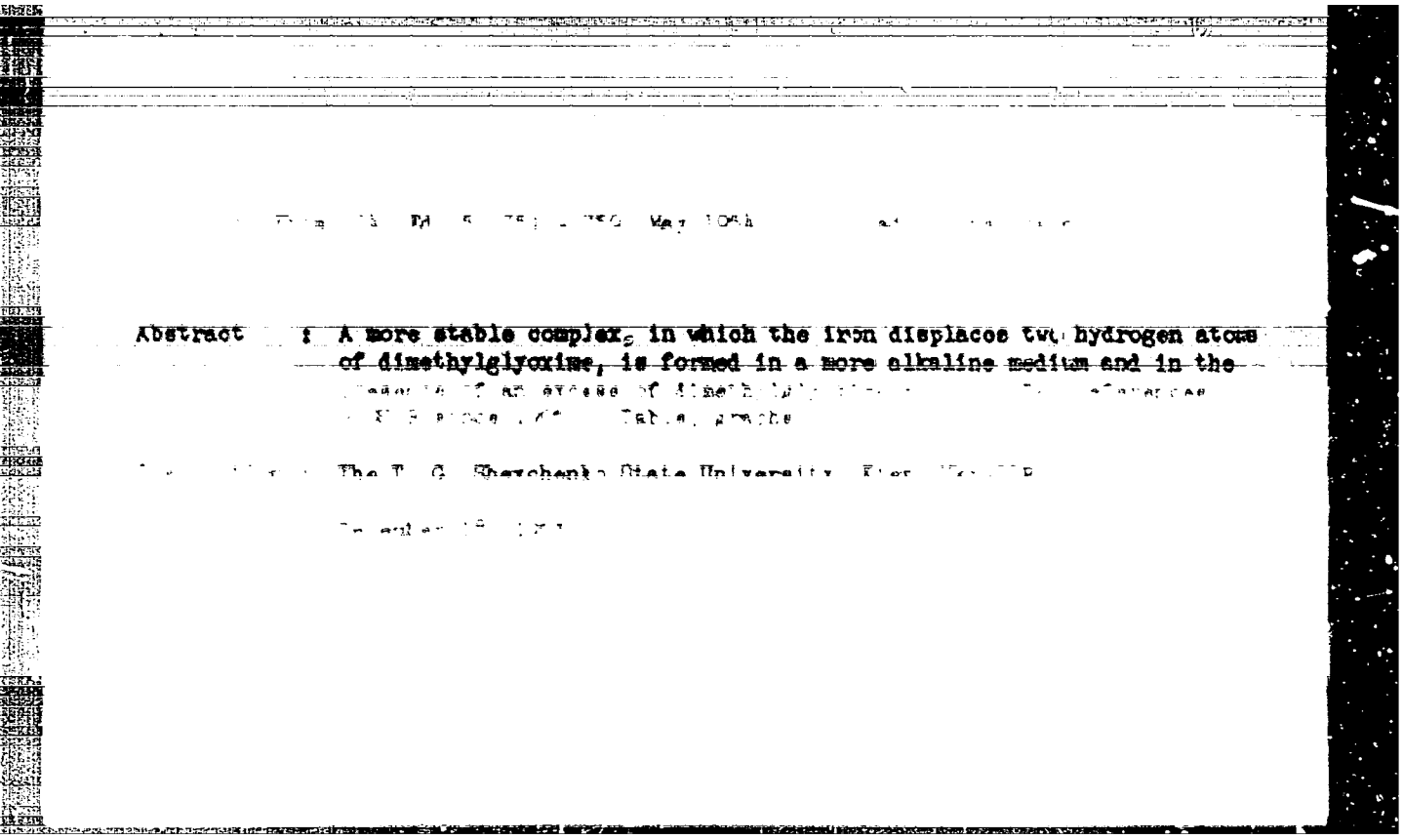
USSR/Chemistry

[illegible]

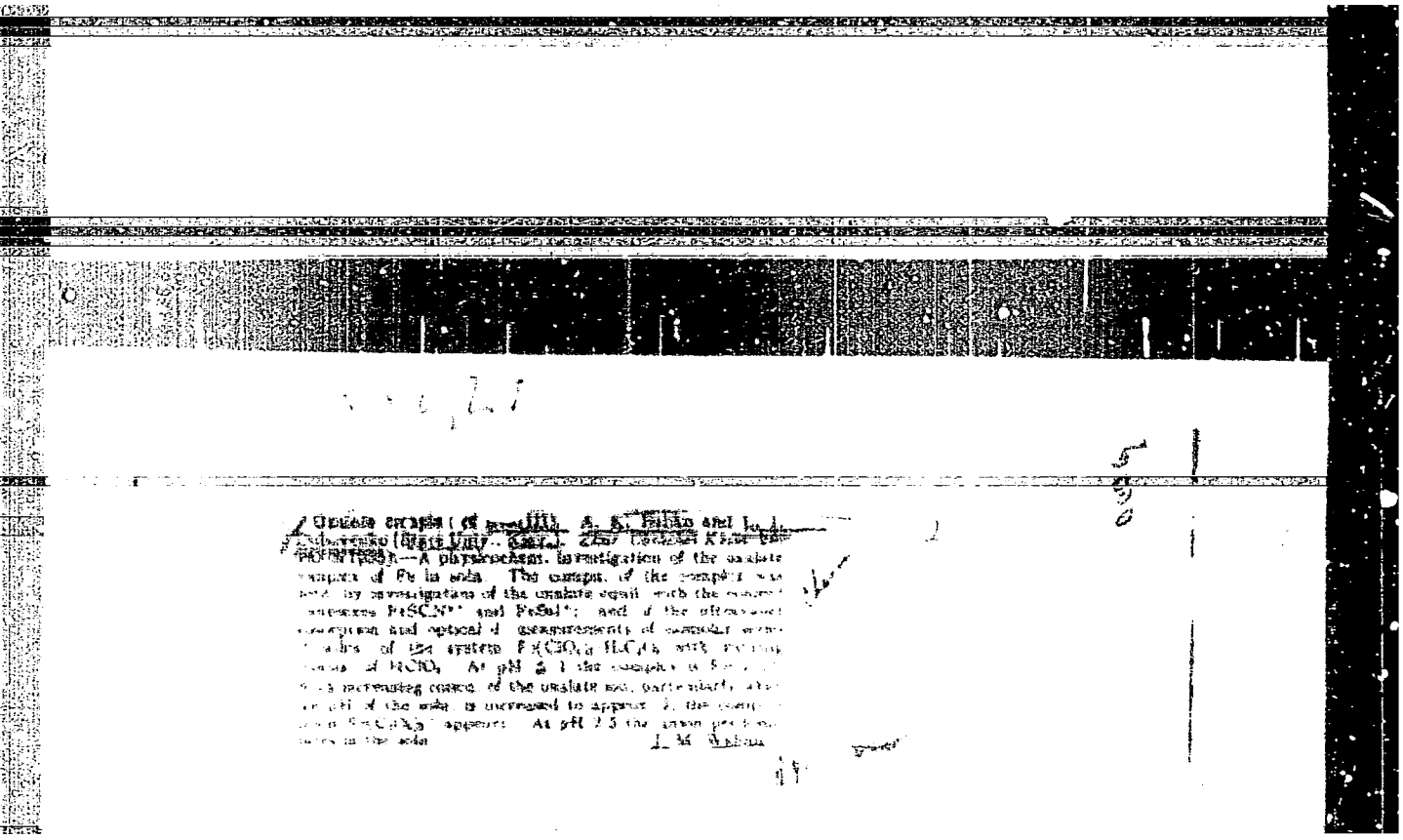
[illegible]

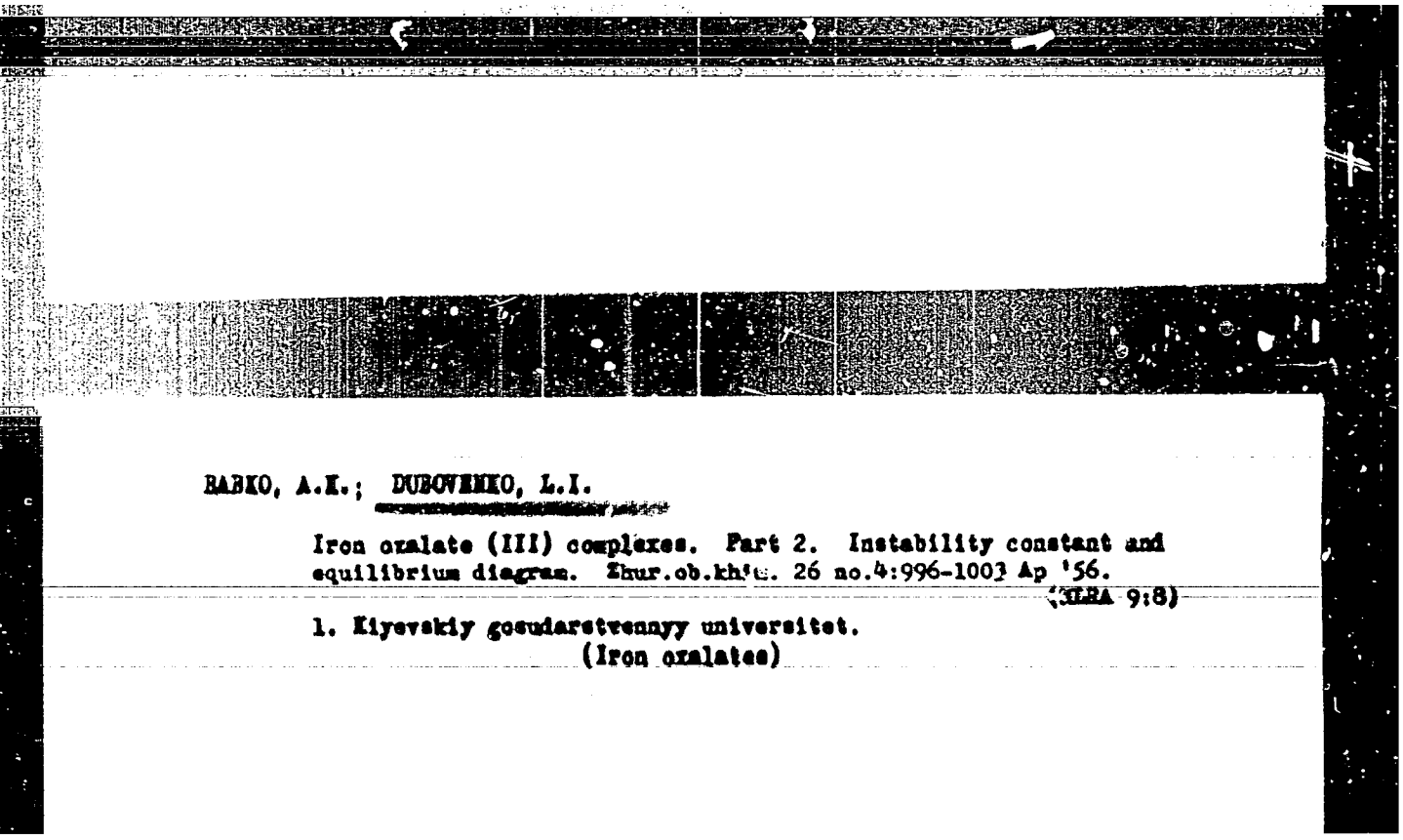
Zhur. Ob. Khim., 24, Ed. 5, 751 - 75[illegible], May [illegible]

[illegible] carried out with the aid of a physico-chemical method of analyzing [illegible]. The optical density was [illegible] the system. It was found, in [illegible] and in accordance with [illegible] system that the composition of the [illegible] depends [illegible] the ratio of Fe^{+++} and [illegible]. The equ[illegible] reaction equilibrium upon the H^{+} [illegible] and on the bases of the data [illegible] of the complex was computed by [illegible] complex group most likely $FeHTa^{+}$ [illegible] the presence of a Fe^{++} [illegible] was [illegible]



Abstract : A more stable complex, in which the iron displaces two hydrogen atoms of dimethylglyoxime, is formed in a more alkaline medium and in the



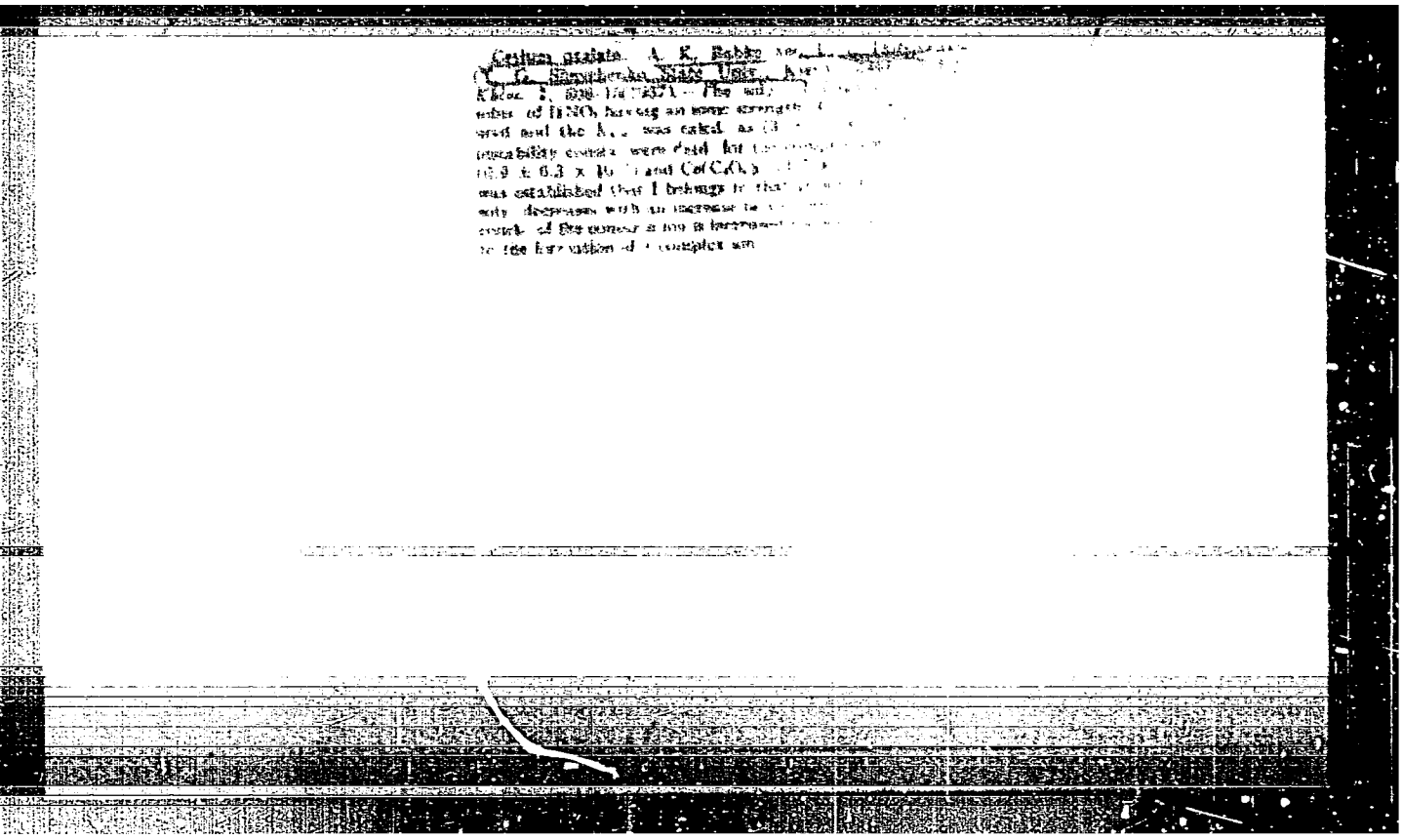


RABKO, A.E.; DUBOVENKO, L.I.

Iron oxalate (III) complexes. Part 2. Instability constant and equilibrium diagram. Zhur.ob.khim. 26 no.4:996-1003 Ap '56. (MLRA 9:8)

1. Kiyevskiy gosudarstvennyy universitet.
(Iron oxalates)

DUBOVENKO, L. I. Cand Chem Sci -- (diss) "Study of oxalate complexes of certain metals in solution" ~~dissolved metals~~" Kiev, 1957. 17 pp (with figures) 22 cm. (Min of Higher Education UkSSR. Kiev State U im T. G. Shevchenko), 100 copies. (KL, 13-57, 97)



5(2)

AUTHORS: Babko, A. K., Dubovenko, L. I. SOV/78-4-2-21/40

TITLE: The Oxalic Acid Complexes of Titanium (IV) (Shchavelevokislyye kompleksy titana (IV))

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 2, pp 372-378 (USSR)

ABSTRACT: The production conditions of the titanium complexes with oxalic acid in an acid medium were determined and the composition and stability of these complexes investigated. Physico-chemical methods were used for investigating the oxalate-complex formation. The absorption spectra of the titanyloxalic acid complex in the ultra-violet zone were recorded and it was found that the absorption maximum is at 213-220 mμ. The composition of the complex was determined at a wave length of 213 mμ by the method of isomolar series. It was found that at pH ≤ 1 titanium and oxalate ions form a complex of the composition $TiOC_2O_4$. Upon increase of the pH value of the solution complex anions are formed, e. g. $TiO(C_2O_4)_2^{2-}$. The dissociation constant of the titanylmono-

Card 1/3

oxalate complex and the stability constant of the titanyl-dioxalate complex were determined. The average values are as follows:

$$K_{TiOC_2O_4} = \frac{[TiO^{2+}][C_2O_4^{2-}]}{[TiOC_2O_4]} = 2.5.10^{-7} = K_1$$

$$K_{TiO(C_2O_4)_2^{2-}} = \frac{[TiOC_2O_4][C_2O_4^{2-}]}{[TiO(C_2O_4)_2^{2-}]} = 5.10^{-4} = K_2$$

The complete dissociation constant of the titanyldioxalate complex is:

$$K = \frac{[TiO^{2+}][C_2O_4^{2-}]^2}{[TiO(C_2O_4)_2^{2-}]} = K_1.K_2 = 1.25.10^{-10}$$

The conditions of precipitating the titanyl ion in the form of titanyl hydroxide in the presence of oxalate ions were determined. Titanyl hydroxide precipitates from the $TiOC_2O_4$ solution starting at pH~3. If the excess oxalic acid

The Oxalic Acid Complexes of Titanium (IV)

is fivefold titanyl hydroxide does not precipitate before pH > 5. There are 6 figures, 2 tables, and 6 references, 2 of which are Soviet.

ASSOCIATION: Kiyevskiy gosudarstvennyy universitet im. T. G. Shevchenko (Kiyev State University imeni T. G. Shevchenko)

SUBMITTED: November 22, 1957

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S/153/60/003/02/03/034
B011/B003

AUTHORS: Babko, A. K., Dubovenko, L. I.

TITLE: Oxalate Complex Compounds of Zirconium

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i khimicheskaya tekhnologiya, 1960, Vol. 3, No. 2, pp. 226-234

TEXT: The authors studied the hitherto insufficiently investigated formation conditions of oxalate complex compounds of zirconium in acid medium. The physicochemical analysis was applied for determining the complex compound formation in the system Zr^{4+} — $C_2O_4^{2-}$. The optical density of solutions was measured in ultraviolet light. The authors found that the following three complex compounds form in the above system depending on the concentration of the oxalic acid and on the pH of the solution: $ZrC_2O_4^{2+}$, $Zr(C_2O_4)_2$, and $ZrOC_2O_4$. Their formation was confirmed by the investigation of the direction of motion of the ions in electrolysis. The authors determined the dissociation

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Oxalate Complex Compounds of Zirconium

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constant of the zirconium monoxalate complex compound on the basis of the absorption of light in the ultraviolet range. It is $1.6 \cdot 10^{-10}$. A similar value was obtained from the equilibrium of the ferric thiocyanate and oxalate complex compound. The dissociation constants were also calculated for the complex compounds of $Zr(C_2O_4)_2$ ($= 4.6 \cdot 10^{-8}$) (Table 3), $Zr(C_2O_4)_3^{2-}$ ($= 1.9 \cdot 10^{-4}$), and for $Zr(C_2O_4)_4^{4-}$ ($= 5.08 \cdot 10^{-1}$). Furthermore, the instability constant of the zirconyl-oxalate complex compound $ZrOC_2O_4$ ($= 2.1 \cdot 10^{-7}$) and the second instability constant of $ZrO(C_2O_4)_2^{2-}$ ($= 4.57 \cdot 10^{-4}$) were calculated (Table 6). Finally, the authors calculated the nomogram of the equilibria of the oxalate complex compounds of zirconium and zirconyl in solution (Fig. 7). It characterizes the relation between the equilibrium conditions and the stability of complex ions in the system. The following optical densities are shown in tables 1, 4, and 5: those of the isomolar series of the solutions Zr^{4+} in 0.5 and 1.0 M $HClO_4$ in Table 1, those of the system Fe^{3+} — SCN^- — Zr^{4+} — $H_2C_2O_4$ at variable concentrations in Table 4, and those of the system

Oxalate Complex Compounds of Zirconium

S/153/60/003/02/03/034
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Fe^{3+} — SCN^- — $H_2C_2O_4$ — $ZrOCl_2$ at variable concentration of the $ZrOCl_2$ in Table 5. The light-absorption curves are given at various pH of the solution in Figs. 1 and 3. The dependence of the formation of the complex compound on time is illustrated in Fig. 2. The isomolar series of the system $ZrOCl_2$ — $H_2C_2O_4$ in various concentrations of the $HClO_4$ are represented in Fig. 4. The dependence of the absorption of light on the concentration of the oxalic acid is indicated in Fig. 5. The dependence of the concentration of free oxalate ions on the ratio $(ZrC_2O_4^{2+})$: $(Zr(C_2O_4)_2)$ is shown in Fig. 6. There are 7 figures, 6 tables, and 8 references, 4 of which are Soviet.

ASSOCIATION: Kiyevskiy gosudarstvennyy universitet im. T. G. Shevchenko; Kafedra analiticheskoy khimii (Kiyev State University imeni T. G. Shevchenko; Chair of Analytical Chemistry)

SUBMITTED: September 4, 1958

Card 3/3

BABKO, A.K.; DUBOVENKO, L.I.

Equilibrium in solution during the interaction of tricharged cations with doubly charged anions. Zhur. neorg. khim. 6 no.1:136-139 '61. (MIRA 14:2)

1. Kiyevskiy gosudarstvennyy universitet im. T.G. Shevchenko.
(Complex ions) (Dissociation)

DUBOVENKO, L. I.

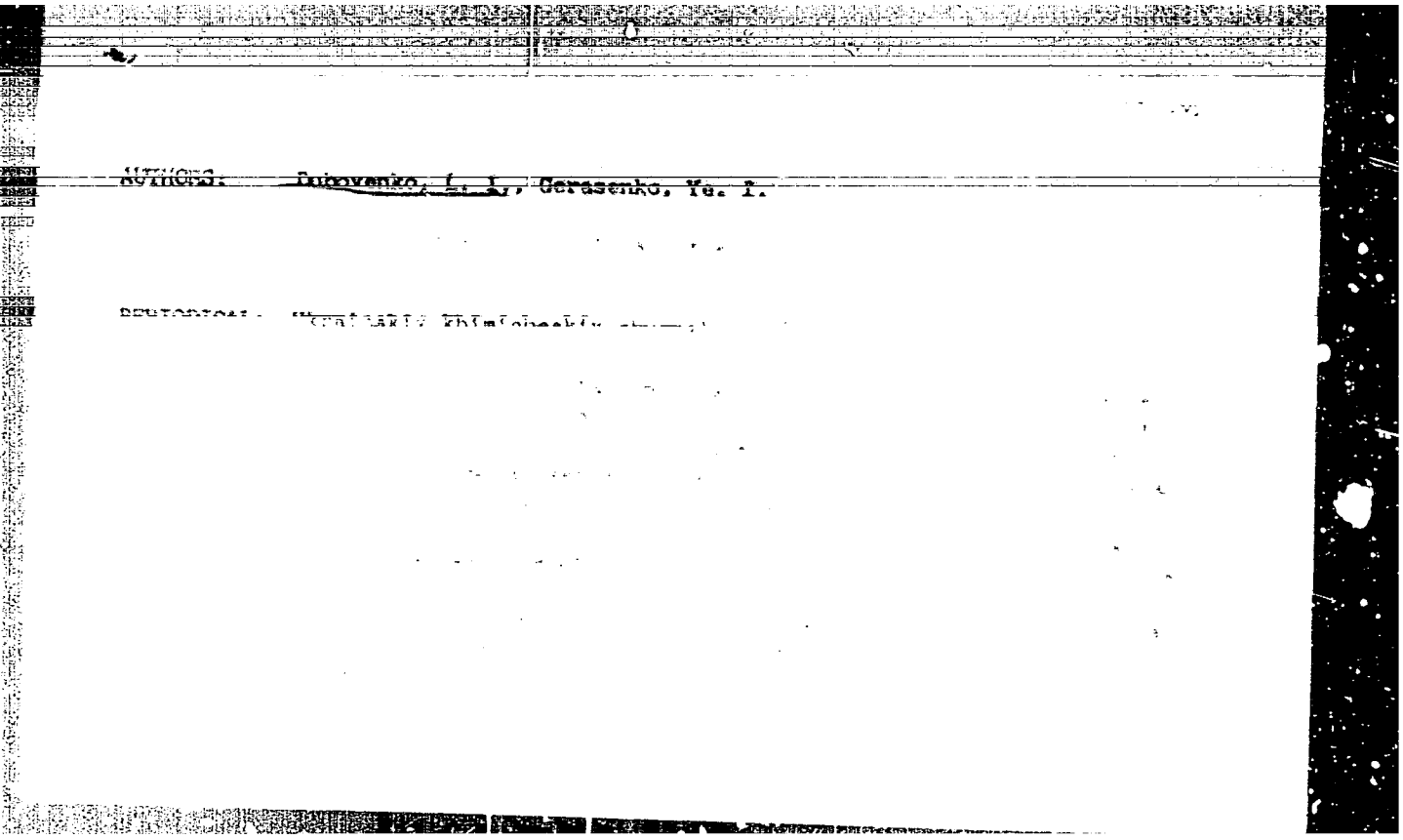
Gallium oxalates. Ukr. khim. zhur. 28 no.6:675-681 '62.
(MIRA 15:10)

(Gallium oxalate)

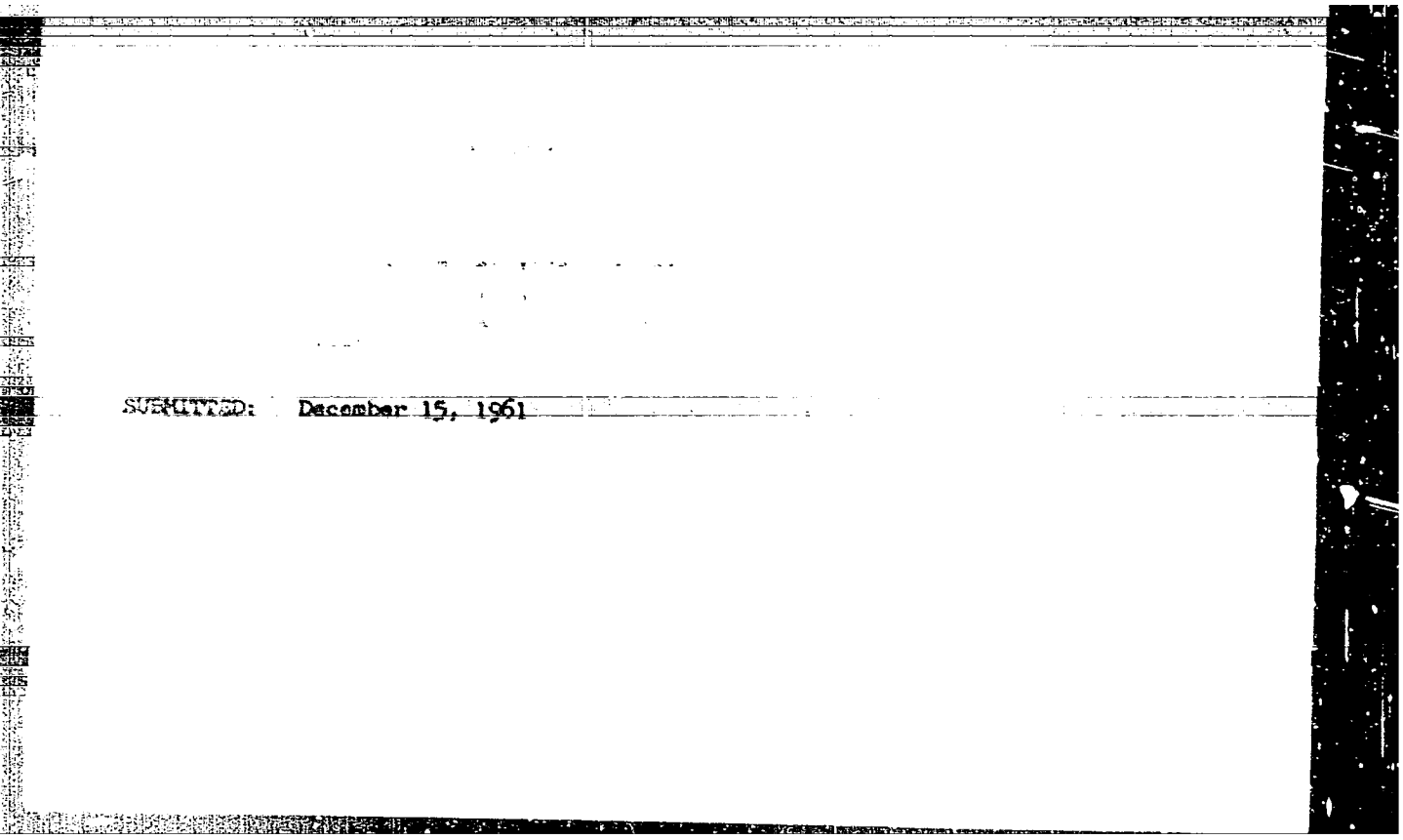
DUBOVENKO, L. I.

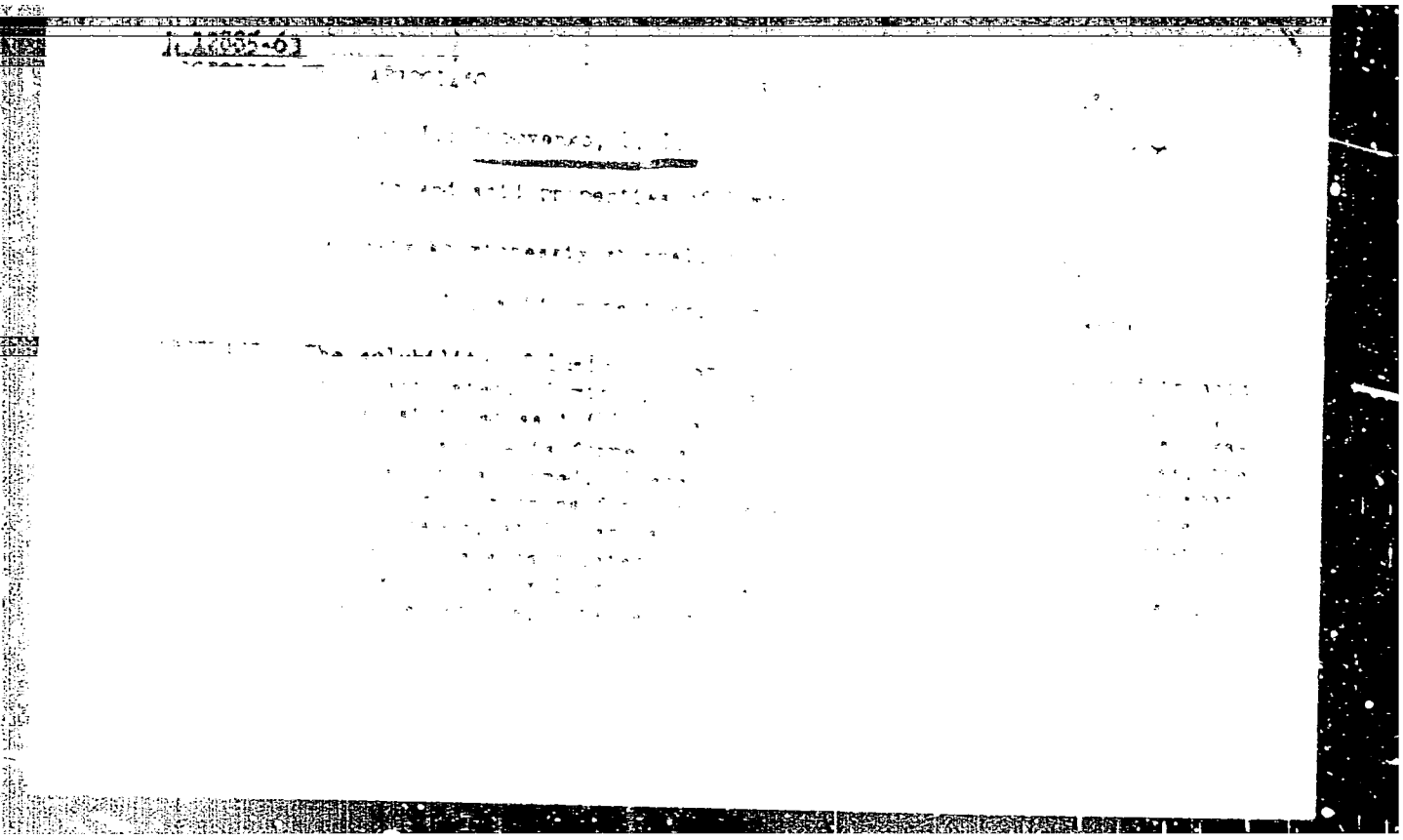
Indium oxalates. Ukr. khim. zhur. 28 no.6:682-687 '62.
(MIRA 15:10)

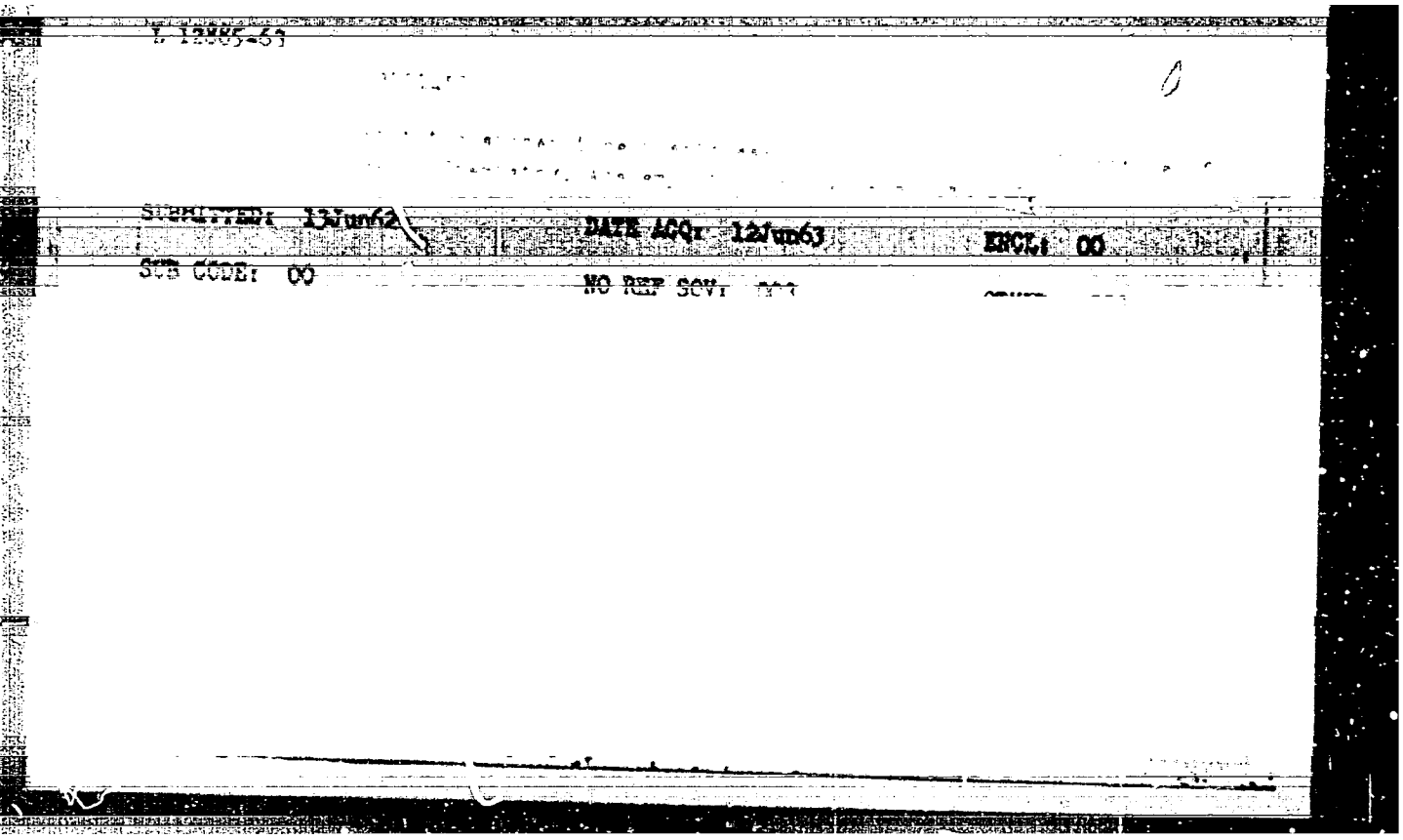
(Indium oxalate)

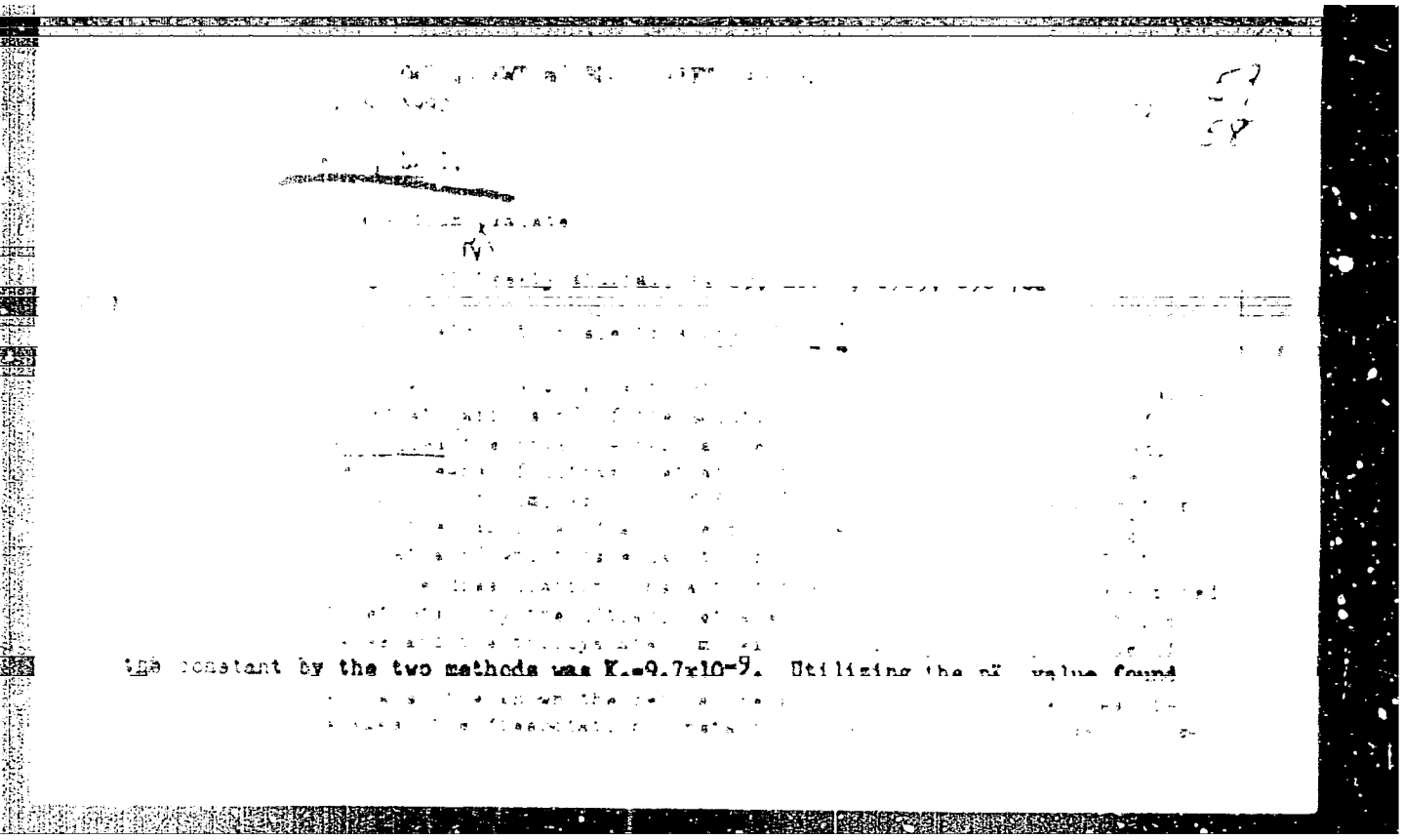


AUTHOR(S): Dubovenko, [illegible], Gerasenko, Ye. I.

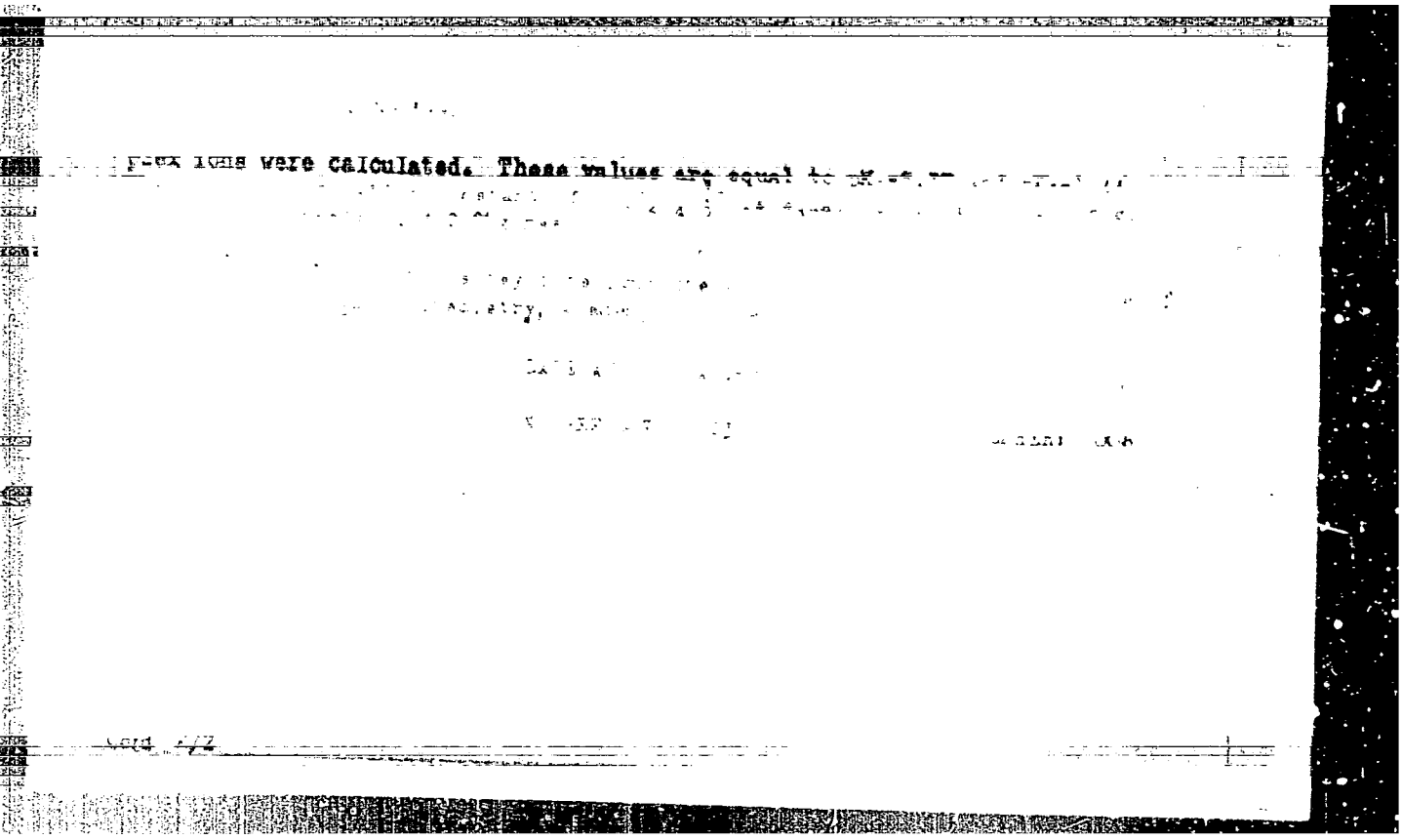








...constant by the two methods was K=9.7x10-9. Utilizing the ...



BABKO, A.K.; DUBOVENKO, L.I.

Complex formation in the copper (II) - luminol system.
Ukr. khim. zhur. 29 no.10:1083-1088 '63. (MIRA 17:1)

1. Institut obshchey i neorganicheskoy khimii AN UkrSSR.

ACCESSION NR: AP4021985 S/0073/64/030/002/0228/0232

AUTHORS: Dubovenko, L. I.; Zhulinskaya, T. F.

TITLE: Determination of the instability constant of oxalate complexes of lanthanum

SOURCE: Ukrainskiy khimicheskiy zhurnal, v. 30, no. 2, 1964, 228-232

TOPIC TAGS: lanthanum oxalate, lanthanum oxalate complex, instability constant, solubility product, lanthanum separation, solubility, equilibrium constant, lanthanum monooxalate complex, lanthanum dioxalate complex, lanthanum trioxalate complex

ABSTRACT: Oxalic acid is used for the precipitation of lanthanoids and their separation from other elements. This study was conducted to determine the properties of lanthanum oxalate and its various complexes. The solubility of lanthanum oxalate in HNO_3 (0.02-0.5N) was determined; the solubility product (average for 0.2-0.5N HNO_3) of $[La^{3+}]^2 [C_2O_4^{2-}]^3 = 1.5 \times 10^{-26}$. The solubility of lanthanum oxalate in the presence of excess oxalate in 0.1 N HNO_3 at 17° decreases if the excess is small (less than 0.03 mole), but increases

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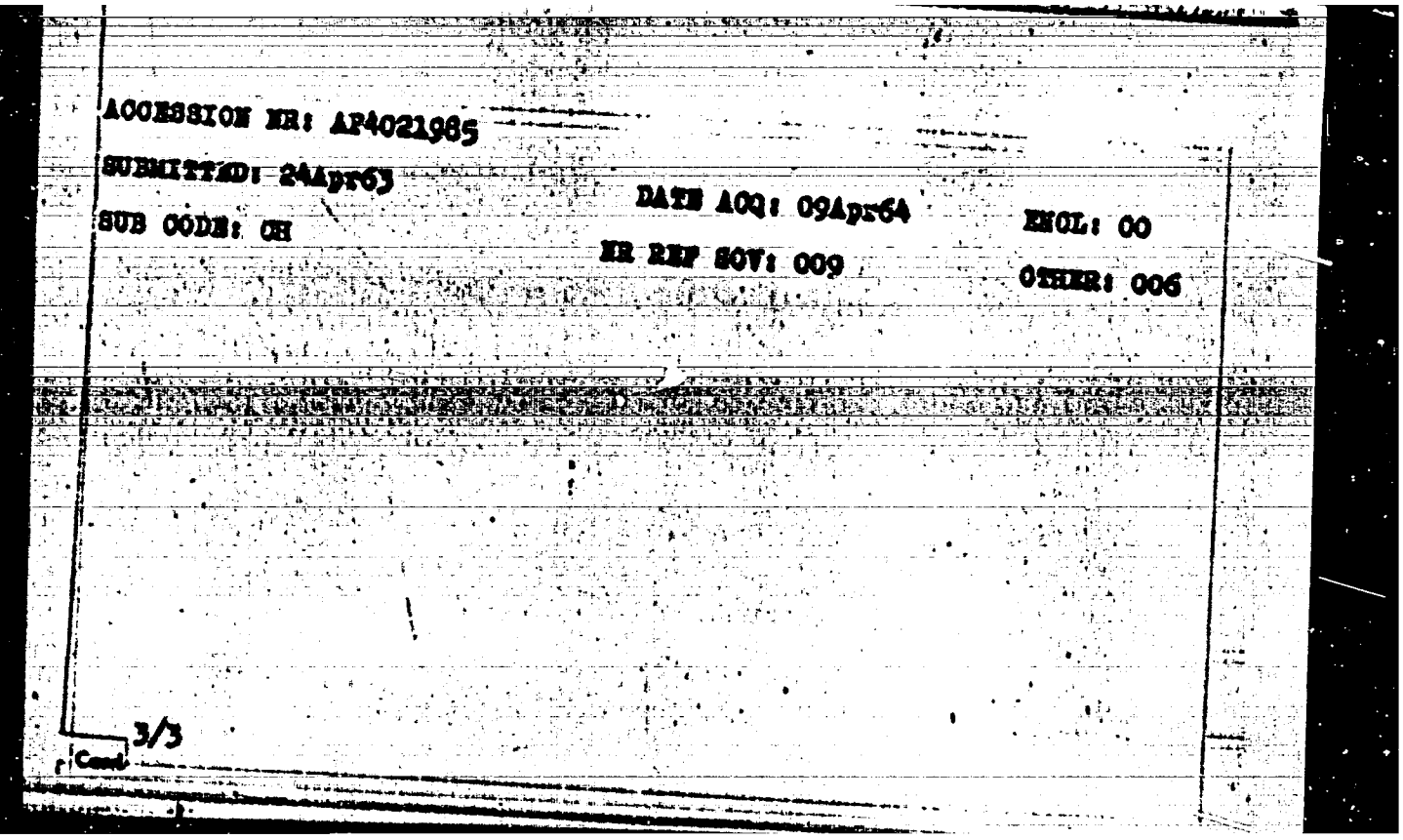
ACCESSION NR: AP4021985

greatly with a large excess. The equilibrium constants for the reaction $La_2(C_2O_4)_3 + La^{3+} \rightleftharpoons 3LaC_2O_4^+$ were calculated. The value for the instability constant of the complex $LaC_2O_4^+$ was approximated to be 1.3×10^{-6}. The solubility of lanthanum oxalate in ammonium oxalate solutions of different concentrations (0.1-0.25 M) at pH 3-4 was studied. The equilibrium constants for the reaction $La_2(C_2O_4)_3 + C_2O_4^{2-} \rightleftharpoons 2La(C_2O_4)_2^-$ were calculated. The instability constant of the $La(C_2O_4)_2^-$ ion was averaged to be 1.9×10^{-9}. The instability constants for the mono-, di- and trioxalate complexes of lanthanum calculated by the Leden method (Z. phys. Chem. A. 188, 160 (1941)) are in close agreement. The instability constant for the coordination saturated complex ion $La(C_2O_4)_3^{3-}$, $K_{La(C_2O_4)_3^{3-}} = [La^{3+}][C_2O_4^{2-}]^3 / [La(C_2O_4)_3^{3-}]$ is 2.2×10^{-10}. Orig. art. has: 8 equations and 3 tables.

ASSOCIATION: Institut obshchey i neorganicheskoy khimii Akademii nauk UkrSSR (Institute of General and Inorganic Chemistry, Academy of Sciences, UkrSSR)

Card 2/3



ACCESSION NR: AP4021985

SUBMITTED: 24Apr63 DATE ACQ: 09Apr64 ENCL: 00

SUB CODE: CH NR REF SOV: 009 OTHER: 006

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Card

L 10605-67
ACC NR: AP7003495 SOURCE CODE: UR/0073/66/032/007/0728/0732

AUTHOR: Babko, A. K.; Terletskaya, A. V.; Dubovenko, L. I.

ORG: Institute of General and Inorganic Chemistry, AN UkrSSR (Institut obshchey i neorganicheskoy khimii AN UkrSSR)

TITLE: Study of the chemiluminescent reaction of luminol with hypochlorite

SOURCE: Ukrainskiy khimicheskiy zhurnal, v. 32, no. 7, 1966, 728-732

TOPIC TAGS: chemiluminescence, hydrogen peroxide

ABSTRACT: The chemiluminescent reaction was studied in the systems luminol -- hypochlorite and luminol -- hypochlorite -- hydrogen peroxide. The influence of pH and concentrations of luminol, hypochlorite, and catalysts on the luminescence intensity was studied, and optimum conditions of determining hypochlorite (free chlorine) were determined. The maximum luminescence was observed at pH 11.5. The total luminescence increased up to a luminol:hypochlorite ratio of 30:1, thereafter increasing only slightly. Ammonia was found to quench the luminescence; in the presence of hydrogen peroxide, the luminescence intensity increased by approximately one order of magnitude. In this case the maximum luminescence intensity was observed at pH 10-11. Under the optimum concentration conditions, the total luminescence was proportional to the hypochlorite concentration.

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ACC NR: AP7003495

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which permitted the development of a procedure for determining free chlorine in aqueous solutions. Bound chlorine (chloramine) gave no luminescence in this case. The sensitivity of the determination, 0.5 micrograms of chlorine per milliliter of solution, was suitable for determining the (free) chlorine content in tap water. The analysis of tap water must be conducted in the absence of interfering oxidizing agents such as $KClO_3$, $K_3Fe(CN)_6$, $Na_2S_2O_8$, $KMnO_4$, and Br_2. Orig. art. has: 8 figures and 2 tables. [JPRS: 38,967]

SUB CODE: 07 / SUBM DATE: 05Apr65 / ORIG REF: 004 / OTH REF: 004

Card 2/2

SHUL'GA, Zakhar Petrovich; DUBOVENKO, Ye.[Dubovenko, Ie.], red.; DEREVYANKO,G. [Derevianko, H.], tekhn.red.

[Collective farm system is a great achievement of the October Revolution] Kolhospnyi lad - velyke zavoiuvannia Zhovtnevoi revoliutsii. Kyiv, Derzh. vyd-vo polit. lit-ry URSR, 1957. 75 p. (Collective farms)

DUBOVENKO, Ye. [Dubovenko, IE.], red.; TSURKAN, P., tekhn.red.

[Chemistry in the service of the Soviet people] Khimiia - na sluzhbu radians'komu narodu; zbirnyk statei. Kyiv, Derzh. vyd-vo polit.lit-ry URSR, 1958. 165 p. (MIRA 12:9)
(Chemical industries)

HAGORNYY, Afanasiy Fedotovich [Hahornyi, P.]; DUBOVENKO, Ye. [Dubovenko, IE.], red.; KOPYTKOVA, M., tekhn.red.

[Economic ties and the overcoming of essential differences between city and village] Ekonomichni zv'iazky i podolannia istotnoi vidminnosti mish mistom i selom. Kyiv, Derzh.vyd-vo polit.lit-ry URSR, 1959. 63 p. (MIRA 13:5)
(Ukraine--Agricultural policy)

LINIYCHUK, Ye.; DUBOVENKO, Ye. [Dubovenko, IE.], red.; LEVCHENKO, O., tekhn.red.

[Collective-farm economic conditions and their significance for the national economy] Kolhospna torhivlia i ii narodnohospodars'ke znachennia. Kyiv, Derzh.vyd-vo polit.lit-ry URSR, 1959. 164 p. (MIRA 13:7)
(Ukraine--Collective farms)

NOSOVSKIY, I.; DUBOVENKO, Ye., red.; LEVCHUK, A., tekhn.red.

[For 200 poods] Za 200 pudov! Kiev, Gos.izd-vo polit.lit-ry USSR, 1960. 57 p. (MIRA 13:5)

1. Sekretar' Konstantinovskogo raykoma Kommunisticheskoy partii Ukrainy, Stalinskoy oblasti (for Nosovskiy).
(Grain)

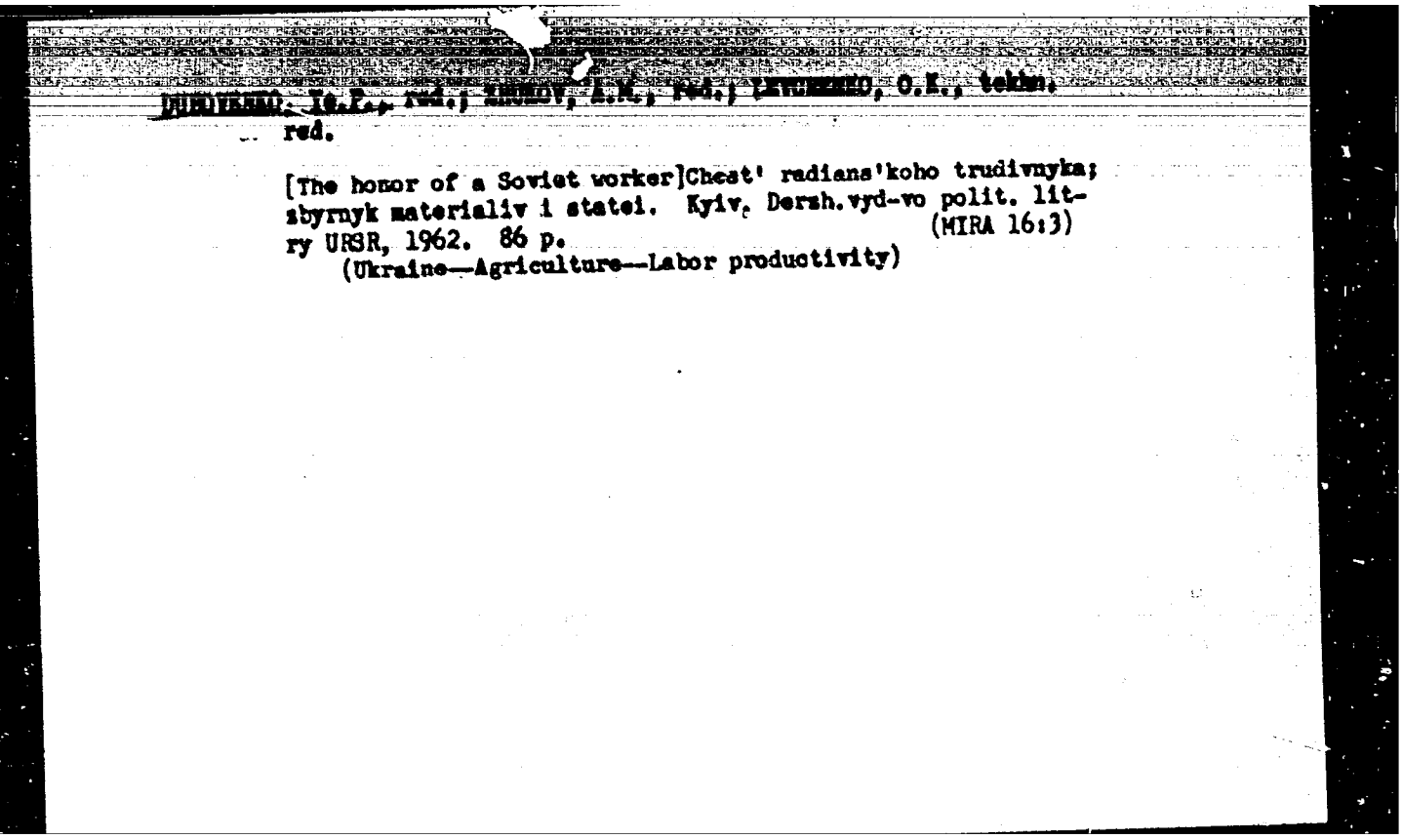
ZADOROZHNYY, Vasiliy Kirillovich [Zadoroshnyi, V.]; PALAMARCHUK, Maksim Martynovich; DUBOVENKO, Ye. [Dubovenko, IE.], red.; LYAMKIN, V., tekhn.red.

[Achievements in the economic development of the western provinces of the Ukrainian S.S.R.] Uspikhy ekonomichnoho rozvytku zakhidnykh oblastey Ukrains'koi RSR. Kyiv, Derzh. vyd-vo polit.lit-ry URSR, 1960. 171 p. (MIRA 13:5)
(Ukraine, Western--Economic conditions)

OSTROVITYANOV, K.V.; GATOVSKIY, L.M. [Hatovs'kyi, L.M.]; KUZ'MINOV, I.I.; DUBOVENKO, Ye. [Dubovenko, IE.], red.; KOBA, M., red.; KOPYTKOVA, N., tekhn.red.

[Political economy; textbook] Politychna ekonomiia; pidruchnyk. Pereklad z 3 perer. i dop. rosiis'koho vyd. 1959 roku. Kyiv, Dersh.vyd-vo polit.lit-ry URSR, 1960. 686 p. (MIRA 13:7)

1. Akademiya nauk USSR, Kiyev. Institut ekonomiki.
(Economics)



[illegible], Ia.P., red.; [illegible], A.K., red.; [illegible], O.K., tekhn. red.

[The honor of a Soviet worker]Chest' radians'koho trudivnyka; zbyrnyk materialiv i statei. Kyiv, Dersh.vyd-vo polit. lit-ry URSR, 1962. 86 p. (MIRA 16:3)
(Ukraine—Agriculture—Labor productivity)

VOL'SKIY, L.N.; DUBOVENKO, Zh.V.; GERSHTEYN, N.A.; PENTEGOVA, V.A.

Study of the composition of essental oils of some coniferous species of Siberia by gas-liquid chromatography. Khim. prirod. soed. no.6:382-384 '65. (MIRA 19:1)

1. Novosibirskiy institut organicheskoy khimii Sibirskogo otdeleniya AN SSSR. Submitted July 8, 1965.

DUBOVET, P. A.

Dissertation defended for the degree of Candidate of Juridicial Sciences at the Institute of Government and Law 1962.

"Responsibility for Physical Injuries Under Soviet Criminal Law."

Vestnik Akad. Nauk, No. 4, 1963, pp 119-145

DUBOVETS, A.

Striving to widen the number of activists. Mast. prom. i khud. promys. 3 no.8:6-7 Ag '62. (MIRA 15:10)

1. Predsedatel' oblastnogo komiteta profsoyuza, Minsk.

(Minsk—Trade unions)

DUBOVETS, M.P.

[redacted] periods for checking high-voltage equipment. Avtom., telem. i sviaz' 2 no.9:41 S '58. (MIRA 11:10)

1. Starshiy inzh. laboratorii signalizatsii i svyazi Vostochno-Sibirskoy dorogi.
(Railroads--Electric equipment--Testing)

DUBOVETS, N.F.

Maintenance of a long-distance cable. Avtom., telem. i sviaz' 7 no.5:28-31 My '63. (MIRA 16:7)

1. Starshiy inzh. laboratorii signalizatsii i svyazi Vostochno-Sibirskoy dorogi.
(Electric railroads—Communication systems)
(Electric cables—Maintenance and repair)

DUBOVETSKIY, V. Ya. , Cands Tech Sci.

USSR/Metallurgy - Welding, Equipment Jan/Feb 53

"Electromagnetic Stands for Automatic Welding," A. A. Kazimirov, V. Ya. Dubovetskiy, Cands Tech Sci, Inst of Electric Welding im Ye. O. Paton

Avtomat Svarka, No 1, pp 55-62

Describes stands for welding large sheet-metal constructions. They permit welding on flux pads, increasing productivity of welding operation and improving quality of welds. On basis of long production experience, gives some suggestions on design, fabrication and exploitation of stands.

279T47

28(1) SOV/125-59-7-12/19

AUTHOR: Savko, P.I., Dubenko G.P., Dubovetskiy, V.Ya.

TITLE: Automatic Machine for Assembling and Welding of Hollow Balls

PERIODICAL: Avtomaticheskaya svarka, 1959, Nr 7, pp 87-90 (USSR)

ABSTRACT: In 1958, the Paton Institute of Electric Welding constructed an automatic machine for assembling and gas-electric welding of hollow steel balls. The balls consist of two semi-spheres of 20 cm in diameter; they are stamped of steel sheets. Such balls are used in big quantities by machine- and shipbuilding works. The weld connecting both semi-spheres should be very strong; it must stand a pressure of up to 50 atm. As a method of semi-sphere joining, gas-electric welding was selected in protective atmosphere of carbon dioxide. The processes of assembling, welding, as well as the auxiliary operations are performed by the new machine automatically. The parameters of the welding process are: 1) electrode wire 1 mm in diameter;

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Automatic Machine for Assembling and Welding of Hollow Balls

2) speed of electrode movement 190 m/hour; 3) electric current - reverse polarity 130 amp DC; 4) welding arc voltage 18-20 volt; 5) speed of welding 40 m/hour; 6) carbon dioxide consumption 8-10 litres/minute; 7) time of welding 55 seconds. There are 1 diagram and 1 photograph

ASSOCIATION: Ordena trudovogo krasnogo znameni institut elektrosvarki imeni Ye.O. Patona AN USSR/ Order of the Red Banner of Labor Institute of Electric Welding, AS UkrSSR, imeni Ye.O. Paton/

SUBMITTED: April 9, 1959

SOV/125-59-10-10/16

AUTHOR: Dubovetskiy, V.Ya., and Livinskiy, V.P., Engineers

TITLE: The Semi-Automatic Welding in Carbon Dioxide for Pipeline Butt-Seams Without Backing Rings

PERIODICAL: Avtomaticheskaya svarka, 1959, Nr 10, pp 81-84 (USSR)

ABSTRACT: The article briefly describes research carried out in recent years by the Institut elektrosvarki imeni Ye. O. Patona (Institute of Electric Welding imeni Ye.O. Paton) on the possibilities of conducting the welding of long-distance pipelines on the construction site itself. Work on the semi-automatic welding of piping on Section 1 SU-4 (Kursk rayon) of the Shebelinka-Belgorod- Bryansk gas supply line carried out in June 1959: the subject of the test was 19-G steel tubing from the Chelyabinskiy trubnyy zavod (Chelyabinsk Tubing Plant), and the equipment and energy used were A-607 semi-automatic welders (Fig 1), Sv-08G2SA welding wire (diameter 1.2mm), current 125-200 amps, and arc-voltage 20-25 volts. Fig 1 illustrates the welding machine, showing the tubing container (1) the feed mechanism; (2) the coil of electrode wire (3) and the wiring scheme is shown in Fig 2; the welding process was con-

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The Semi-Automatic Welding in Carbon Dioxide of Pipiline Butt-Seams Without Backing Rings

trolled by means of the voltmeter and ammeter. The new method was tested on 320 revolving butt-ends: the tubes were aligned as shown in Fig 3 by means of a surrounding framework; the first layer of the welding was carried out from the top to bottom by 3 welders, and the second one was automatically welded (PT-56 equipment, current - 400 amps, arc-voltage 48 volts). At the same time 172 fixed butts without backing rings were welded by 2 different methods: 1) the first layer was welded by an A-607 semi-automatic welder manufactured by the Institute of Electric Welding imeni Ye. O.Paton, the second by AS-59 automatic welders from the VNIIST; 2) both layers were welded by semi-automatic welders. The automatic welding was carried out in VNIIST and KRMZ. There are 3 photographs and 1 diagram.

ASSOCIATION: Ordena trudovogo krasnogo znameni institut elektrosvarki imeni Ye.O.Patona AN USSR (Order of the Red Banner of Labor Institute of Electric Welding imeni Ye.O. Paton AS UkrSSR)

SOV/125-59-10-10/16

The Semi-Automatic Welding in Carbon Dioxide of Pipeline Butt-Seams Without Backing Rings

SUBMITTED: August 3, 1959.

Card 3/3

DUBOVETSKIY, V.YA.

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1.2300 also 1206, 2708, 2308

S/135/60/000/004/004/008
A115/A029

AUTHORS: Pal'kevich, A.S., Candidate of Technical Sciences, Marchenko, Yu.I., Engineer, Movko, P.I., Candidate of Technical Sciences, Kirinskiy, V.P., Engineer, Dubovetskiy, V.Ya., Engineer

TITLE: CO_2 Shielded Arc Welding of Gas Pipelines

PERIODICAL: Svarochnoye proizvodstvo, 1960, No. 4, pp. 22 - 25

TEXT: This article was worked out in collaboration with the Engineers of the Svarochno-montazhnyy trest (Welding Engineering Trust) F.A. Zamko, G.Ya. Kogan, V.A. Gusta, G.K. [illegible], members of the VNIIAVT (All-Union Scientific Research Welding Institute) A.S. Vasmakhtin, V.N. Yampol'skiy, V.I. Fedorov and A.Z. Karpachinskiy; Chief Engineer of the Kiyevskiy remontno-mekhanicheskiy zavod (Kiev Mechanical Repair Plant) M.M. Unigovskiy and members of the Institut elektrosvarki im. Ye.O. Patona (Institute of Electric Welding imeni Ye.O. Paton) D.A. Dudko and [illegible]. After a brief review of welding methods used in construction of pipe lines in the USSR, some new methods developed since 1959 are described. In July 1959 tests with CO_2-shielded welding without grounds were performed on the [illegible] gas pipe line by the Welding Engineering Plant (SP-4), All-

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-Union Scientific Research Welding Institute, Institute of Electric Welding imeni Ye.O. Paton and Kiev Mechanical Repair Plant of the Glavgaz of the USSR (KRMZ) for the tests performed on 11 m long, 720 mm in diameter and 8 - 10 mm thick 19[illegible] steel pipes made in Chelyabinsk the following equipment was used: centering collars produced by the KRMZ (Fig. 1), centering collars produced by the Institute of Electric Welding (Fig. 2) weighing 25 kg each, ПЭУ-53 (PESU-53) welding set (Fig. 3) equipped with a ЯАЗ-М206 (YaAZ-M206) diesel engine, 3 generators and 6 CO_2 containers; A-607 semiautomatic welding apparatus (Figs. 4 and 5) produced by the Institute of Electric Welding imeni Ye.O. Paton, АС -59 (AS-59) twin welding apparatus designed and produced by the All-Union Scientific Research Welding Institute and a control panel (Fig. 9). The use of the AS-59 welding apparatus is described and shown in Figures 6 - 8. By this method 1,970 m pipe line was completed in 1 shift by 1 centering team, 4 welding sets and 8 welders. There are 9 figures and 3 Soviet references.

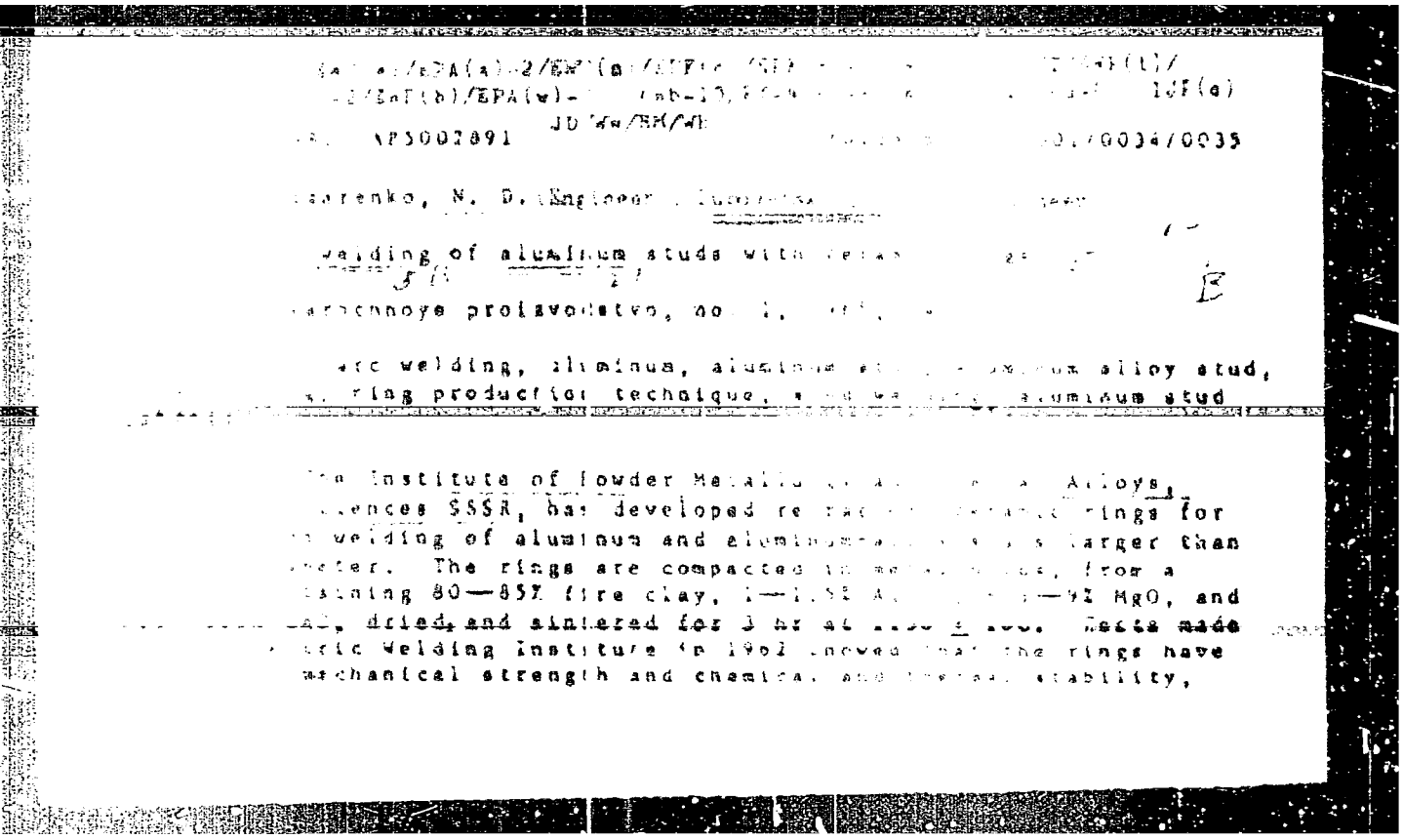
ASSOCIATION: VNIIAVT (All-Union Scientific Research Welding Institute) and Institut elektrosvarki im. Ye.O. Patona (Institute of Electric Welding imeni Ye.O. Paton).

Card 2/2

LITVINCHUK, M.D.; BEL'FOR, M.O.; TKACHENKO, V.A.; DUBOVETSKIY, V.Ye.

Equipment for making under flux longitudinal weld joints for mine supports. Avtom. svar. 13 no.9:71-75 S '60. (MIRA 13:10)

1. Ordena Trudovogo Krasnogo Znameni Institut elektrosvarki im. Ye.O.Patona AN USSR.
(Electric welding--Equipment and supplies)



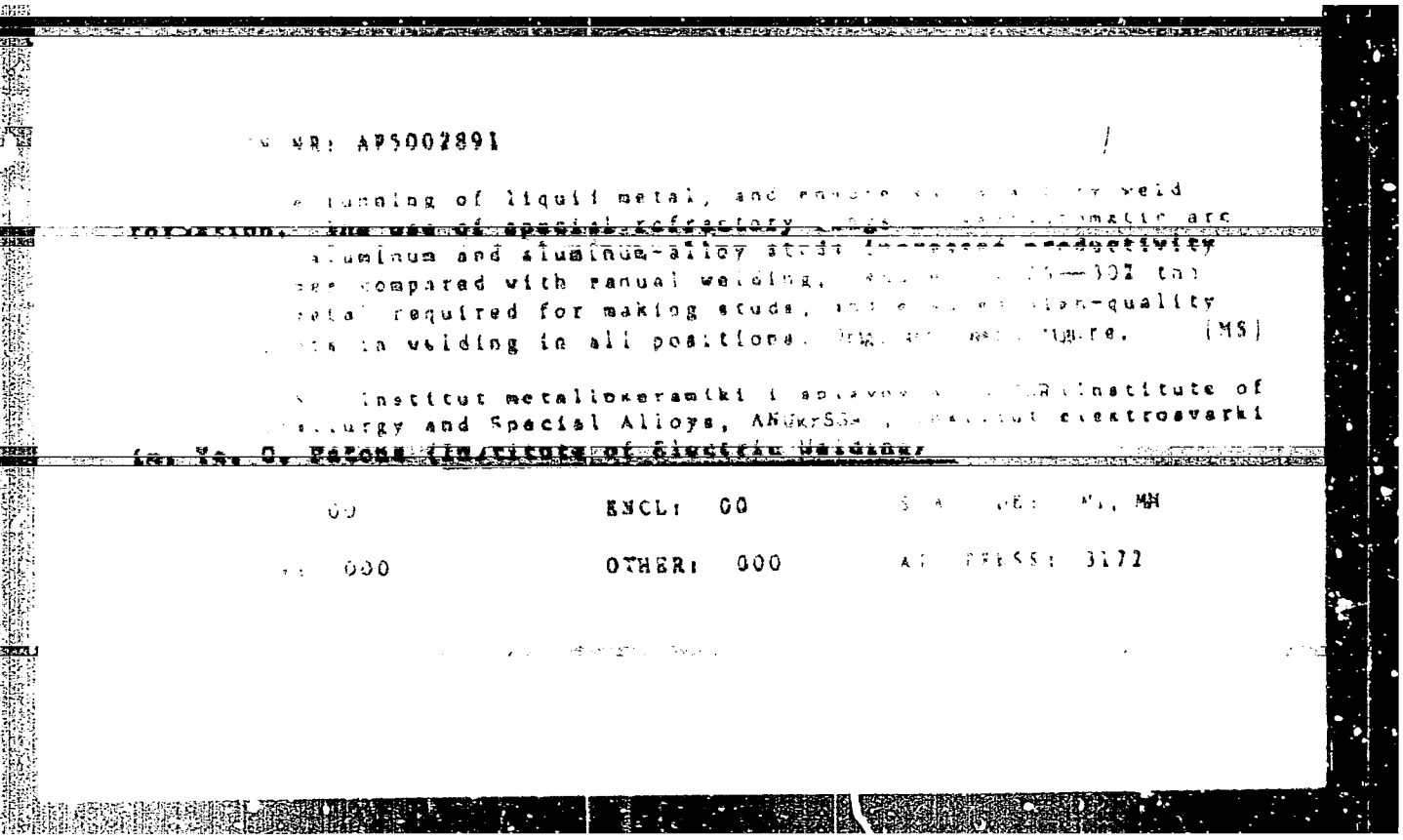
...renko, N. D. Engineer ...

...welding of aluminum studs with ...

...arshchnoye proizvodstvo, no. 1, ...

...tric welding, aluminum, aluminum ... aluminum alloy stud, ... ring production technique, ... welding, aluminum stud

...e Institute of Powder Metallu... ... Alloys, ...ences SSSR, has developed re... rings for ...welding of aluminum and alumin... ... larger than ...eter. The rings are compacted ... from a ...taining 80—85% fire clay, 1—1.5% A... —9% MgO, and ...Al, dried and sintered for 3 hr at ... Tests made ...tric Welding Institute in 1961 showed that the rings have ...echanical strength and chemical and thermal stability,



UR: AP5002891

running of liquid metal, and ensure [illegible] weld
[illegible] formation, the use of special refractory [illegible] automatic arc
aluminum and aluminum-alloy studs increased productivity
are compared with manual welding, [illegible]—10% the
metal required for making studs, and [illegible] high-quality
[illegible] in welding in all positions. [illegible] figure. [MS]

[illegible] Institut metallokeramiki i [illegible] AN USSR Institute of
[illegible]urgy and Special Alloys, AN USSR; [illegible] Institut elektrosvarki
im. Ye. O. Patona (Institute of Electric Welding)

SUB CODE: 00 ENCL: 00 SUBMITTED: MH, MH

NR REF SOV: 000 OTHER: 000 ATD PRESS: 3172

DUBOVETSKIY, V.YE.

FISHKIS, M.M.; PATON, V.Ye.; DUBOVETSKIY, [illegible]

Automatic welding under flux with use of magnetically moving equipment for the construction of presses. Avtom. svar. 10 no.5: 106-111 S-O '57. (MIRA 10:12)

1. Moskovskiy avtomobil'nyy zavod im. Likhacheva (for Fishkis).
2. Ordena Trudovogo Krasnogo Znameni Institut elektrosvarki im. Ye.O. Patona AN USSR (for Paton, Dubovetskiy).
(Power presses--Welding) (Magnetic instruments)

DUBOVICH, M.L.

Training highly qualified workers. Tekst.prom. 14 no.6:52 Je '54.
(MLRA 7:7)

1. Zaveduyushchiy uchebno-proizvodstvennoy chast'yu shkoly FZU pri Klinteovskoy sukonnoy fabrike im. Lenina.
(Textile schools)

DUBOVICH, V P.

PHASE I BOOK EXPLOITATION SOV/5486

Vsesoyuznoye soveshchaniye po vnedreniyu radioaktivnykh izotopov i yadernykh izlucheniy v narodnoye khozyaystvo SSSR. Riga, 1960.

Radioaktivnyye izotopy i yadernyye izlucheniya v narodnom khozyaystve SSSR; trudy soveshchaniya v 4 tomakh. t. 1: Obshchiye voprosy primeneniya izotopov, pribory s istochnikami radioaktivnykh izlucheniy, radiatsionnaya khimiya, khimicheskaya i neftepererabatyvayushchaya promyshlennost' (Radioactive Isotopes and Nuclear Radiations in the National Economy of the USSR; Transactions of the Symposium in 4 Volumes. v. 1: General Problems in the Utilization of Isotopes; Instruments With Sources of Radioactive Radiation; Radiation Chemistry; the Chemical and Petroleum-Refining Industry) Moscow, Gostoptekhizdat, 1961. 340 p. 4,140 copies printed.

Sponsoring Agency: Gosudarstvennyy nauchno-tekhnicheskiy komitet Soveta Ministrov SSSR, and Gosudarstvennyy komitet Soveta Ministrov SSSR po ispol'zovaniyu atomnoy energii.

Ed. (Title page): N.A. Petrov, L.I. Petrenko and P.S. Savitskiy; Eds. of this Vol.: L.I. Petrenko, P.S. Savitskiy, V.I. Sinitsin, Ya. M. Kolotyrkin, N.P. Syrkus and R.F. Romm; Executive Eds.: Ye. S. Levina and B. F. Titskaya; Tech. Ed.: E.A. Mukhina.

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Radioactive Isotopes (Cont.) SOV/5486

PURPOSE: The book is intended for technical personnel concerned with problems of application of radioactive isotopes and nuclear radiation in all branches of the Soviet economy.

COVERAGE: An All-Union Conference on problems in the introduction of radioactive isotopes and nuclear radiation into the national economy of the Soviet Union took place in Riga on 12-16 April 1960. The Conference was sponsored by: the Gosudarstvennyy nauchno-tekhnicheskiy komitet Soveta Ministrov SSSR (State Scientific and Technical Committee of the Council of Ministers, USSR); Glavnoye upravleniye po ispol'zovaniyu atomnoy energii pri Sovete Ministrov SSSR (Main Administration for the Utilization of Atomic Energy of the Council of Ministers, USSR); Academy of Sciences, USSR; Gosplan USSR; Gosudarstvennyy komitet Soveta Ministrov SSSR po avtomatizatsii i mashinostroyeniyu (State Committee of the Council of Ministers, USSR, for Automation and Machine Building) and the Council of Ministers of the Latvian SSR. The transactions of this Conference are published in four volumes. Volume I contains articles on the following subjects: the general problems of the Conference topics; the state and prospects of development of radiation chemistry; and results and prospects of applying radioactive isotopes and nuclear radiation in the petroleum refining and chemical industries. Problems of designing and manufacturing instruments which contain sources of radioactive radiation and are used for checking and automation of technological processes are examined, along with problems of accident prevention in their use. No personalities are mentioned. References accompany some of the articles.

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Radioactive Isotopes (Cont.) SOV/5486

TABLE OF CONTENTS:

GENERAL PROBLEMS OF THE USE OF ISOTOPES

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DUBOVIK, A.A.

Elements of the theory of mirror scanning. Zhur.nauch.i prikl. fot.i kin. 2 no.4:293-303 Jl-Ag '57. (MLRA 10:7)

1. Institut khimicheskoy fiziki Akademii nauk SSSR.
(Photography) (Optics, Geometrical)

DUBOVIK, A.I.

Improvement of electrocoagulation in rhinosurgery. Vest. otorinolar., Moskva 14 no.1:66 Jan-Feb 52. (CLML 21:4)

1. Of the Clinic for Diseases of the Ear, Throat, and Nose (Head--Prof. I.M. Krukover), Irkutsk Medical Institute.

DUBOVIK, A.I., assistant.

Instrument for the measurement of mandibular movements. Stomatologiia no.6:56 '53. (KLRA 7:1)

1. Iz kliniki bolezney ukha, gorla i nosa (zaveduyushchiy - professor I.M.Krukover) Irkutskogo gosudarstvennogo meditsinskogo instituta (direktor - dotsent K.K.Alkalayev).
(Jaws) (Dental instruments and apparatus)

DUBOVIK, A.I.

Clamp used in surgery of the nasal septum. Vest. otorinolar., Moskva 15 no.2:83-84 Mar-Apr 1953. (CIML 24:3)

1. Of the Clinic for Diseases of the Ear, Throat, and Nose (Head -- Prof. I. M. Krukover), Irkutsk Medical Institute.

DUBOVIK, A.I.; KRUKOVER, I.M., professor, zaveduyushchiy.

Foreign body in the larynx retained during 10 days. Vest.oto-rin. 15 no.3: 87 My-Je '53. (MLRA 6:8)

1. Klinika bolezney ukha, gorla i nosa Irkutskogo meditsinskogo instituta.
(Larynx--Foreign bodies)

DUBOVIK, A.I.

Rhinogenous meningitis and thrombosis of the cavernous sinus; cure. Vest. otorinolar., Moskva 15 no.3:89 May-June 1953. (CLML 25:1)

1. Of the Clinic for Diseases of the Ear, Throat, and Nose (Head -- Prof. M. M. Krukover), Irkutsk Medical Institute.

DUBOVIK, A.I.

Point for electrocoagulation in the larynx. Vest.oto-rin 17 no.3:71 My-Je '55. (MLRA 8:9)

1. Iz kliniki bolezney ukha, gorla i nosa (dir.-prof. I.M. Krukover) Irkutskogo meditsinskogo instituta.

(LARYNX, surgery
electrocoagulation, tube point)
(DIATHERMY,
electrocoagulation of larynx, tube point)

DUBOVIK, A.I.

Utilization of dephenolized waste waters by a coal-cleaning plant. Koks i khim. no.4:16-17 '61. (MIRA 14:3)

1. Giprokoks.
(Coal preparation)

NIKIFOROV, B.I. (Minsk); DUBOVIK, A.I. (Minsk)

Hemangiomas of the placenta and their thanatogenetic significance for the fetus. Arkh.pat. 27 no.7:65-66 '65. (MIRA 18:8)

1. Kafedra patologicheskoy anatomii (zav. - prof. Yu.V.Gul'kevich) i 2-ya kafedra akusherstva i ginekologii (zav. - dotsent Z.F. Drobenya) Minskogo meditsinskogo instituta.

KHOLOPTSEV, V.P.; DOBROVOL'SKIY, I.P.; MEYZHMAK, V.Ye.; DUBOVIK, A.N.

Improved methods for the production of electrode coke. Koks i khim. no.7:29-32 Jl '61. (MIRA 14:9)

1. Chelyabinskiy metallurgicheskiy zavod (for Kholoptsev, Dobrovol'skiy). 2. Koksokhimstantsiya (for Meyzhmak, Dubovik).
(Coke industry)

SHEMERYANKIN, B.V.; DOBROVOL'SKIY, I.P.; KOSTYUNIN, I.K.; KOPELIOVICH, L.V.; DUBOVIK, A.N.; Prinimali uchastiye: KOSTENKO, A.R.; VAKHTOMOV, S.P.; CHERVOV, A.P.

Ways of reducing the porosity of pitch coke. Koks i khim. no.2:25-29 '62. (MIRA 15:3)

1. Chelyabinskiy metallurgicheskiy zavod (for Shemeryankin, Dobrovol'skiy, Kostyunin, Kopeliovich, Kostenko, Vakhtomov, Chervov). 2. Koksokhimstantsiya (for Dubovik).
(Coke)

DUBOVIK, A.P.

We are working ahead of schedule. Transp. strei. 9 no.4:7-8 Ap '59. (MIRA 12:6)

(Railroads--Earthwork)

DUBOVIK, A. S., KEVLISHVILI, P. V. and SHNIRMAN, T. L.
Inst. Chem. Phys. AS USSR, Moscow.

"Theoretical Questions of Reflection Evaluation(spiegelauswertung)" without co-authors.

"Beitrage zur Spiegelkamera." (A Slow Motion Camera for 33 million Frames per Second with a Multiple Reflection Evaluation)

paper presented at 4th Intl. Congress on High Speed Photography, Cologne, 22-27 Sep 58.

SOV/77-4-1-2/22

AUTHORS: Dubovik, A.S., Kevlishvili, P.V., and Shnirman, G.B.

TITLE: A Time Magnifier With Multiple Reflection (Lupa vremeni s mnogokratnym otrazheniyem)

PERIODICAL: Zhurnal nauchnoy i prikladnoy fotografii i kinematografii, 1959, Vol 4, Nr 1, pp 12-19 (USSR)

ABSTRACT: The authors have worked out a slow motion camera of LV-1 type (Figures 6 and 7) with a tenfold reflection from 2 rotating mirrors (Figures 1 and 2), permitting the taking of 2 to 33 1/3 million frames a second. The optical system of the camera was calculated by Engineer A.B. Granigg. The electrical part was worked with the participation of Engineers I.A. Korolev and A.M. Tolmachev. The projection of the mechanical part of the LV-1 camera was effected by Senior Engineer-Designer V.F. Voronin. This apparatus, developed in the Institute of Chemical Physics of AS USSR, is intended for the study of

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such phenomena as detonations, spark discharges, etc., and was displayed at the Brussels World Fair of 1958. The mirror system of the camera is put into motion by an electric motor through a step-up gear and reaches 60,000 rpm. The camera is controlled fully automatically by special electronic devices (Figure 5) that control the frequency of photographing and shutter operation, emit a high-voltage pulse to initiate in a given moment the phenomenon to be studied, and stop the photographic operation upon termination. The article describes in detail the design and performance (Table 1) of the camera. There are 2 photos, 4 diagrams, 1 block diagram, and 1 table.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (The Institute of Chemical Physics of AS USSR)

SUBMITTED: July 26, 1958

23(SOV/77-4-3-11/16

AUTHOR: Dubovik, A.S.

TITLE: A Mirror Compensator of Film Displacement

PERIODICAL: Zhurnal nauchnoy i prikladnoy fotografii i kinematografii, 1959, Vol 4, Nr 3, pp 226-233 (USSR)

ABSTRACT: The author develops the theory and computation methods of a new film displacement mirror compensator with intermediate image, intended for motion picture cameras with continuously moving films. In this connection cameras of types SKS-1, SKS-2 and ZL-1 are mentioned. The author also gives general principles of mirror compensator analysis and classification. The mirror compensator with intermediate image belongs to an IKhF camera built in 1952 by the Institute of Chemical Physics of the AS USSR. The optical system was designed by the Doctor of Technical Sciences, G.L. Shnirman. The theory and computation method of the compensator were developed by the author.

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A Mirror Compensator of Film Displacement

The optical system (diagram 1) was to secure a high time interval coefficient ("skvazhnost'"), to satisfy the requirements for the record of swiftly passing phenomena such as explosions, spark discharges, etc. at comparatively low frequencies. Concerning the mirror compensator, the author first develops its working principle (diagram 2). Then he gives a number of formulae which can be used for the computation of film displacement compensation. The third section of the article deals with the working precision of the compensator (graphs and diagrams 4-8). The last section of the article is devoted to an analysis of the effect of the curvature of Pascal's limaçon on the quality of the image. Section 3 of the article (working precision of the compensator) is a general analysis of film displacement compensators. The author concludes that it is indispensable:

Card 2/3 1) To find an equation of image movement while the

A Mirror Compensator of Film Displacement

compensator is working. 2) To compare the paths of film and image during exposure and to find the image displacement, 3) To evaluate the effect of image displacement with regard to the film and to consider the work of the light shutter and the projection of the used film. The author mentions the scientists G. I. Belinskaya and Yu.V. Ryabushkin. Belinskaya calculated the values of the last column of the table on page 232 (calculation of certain values of the optical system). The calculation was based on a method developed by ~~the~~ Ryabushkin. There are 5 diagrams, 2 graphs, 1 table and 10 references, 5 of which are English, 4 Soviet and 1 French.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the AS USSR)

SUBMITTED: 19 June, 1958

DUBOVIK, A.S.

Image displacement in high-speed cameras with image "commutation." Zhur.nauch.i prikl.fot.i kin. 5 no.3: 209-217 My-Je '60. (MIRA 13:7)

1. Institut khimicheskoy fiziki AN SSSR.
(Motion-picture cameras)
(Photography, High speed)

DUBOVIK, A. S. (Institute of Chemical Physics, Academy of Sciences of USSR)
and CARNOV, V.V

High-Speed Stereoscopic Motion Picture Photography at a Rate of Up to 1,250,000 Frames Per Second.

report submitted for : The 5th International High Speed Photography Congress, Washington, D.C. 16-22 Oct., 1960.

DUBOVIK, A. S.

Some Problems of Mirror Scanning Theory for Inclined Mirrors and Inclined Light Beams.

report submitted for: The 5th International High Speed Photography Congress, Washington, D. C. 16-22 Oct. 1960.

DUBOVIK, A. S. (Institute of Chemical Physics, Academy of Sciences of USSR)
GARNOV, V.V.

High-Speed Stereoscopic Motion Picture Photography by means of the O P type of camera.

report submitted for: The 5th International High Speed Photography Congress, Washington, D. C. 16-22 Oct. 1960.

S/077/60/005/003/004/009
E191/E481

AUTHOR: Dubovik, A.S.

TITLE: Image Shift in Slow Motion Devices with Image Commutation

PERIODICAL: Zhurnal nauchnoy i prikladnoy fotografii i kinematografii, 1960, Vol.5, No.3, pp.209-217

TEXT: In mirror type slow motion devices with image commutation which are becoming widely used (e.g. M.C.Kurtz, J.Soc.Motion Picture and Telev.Eng., 1959, p.16) the analysis and design of the optical system have not previously been described in literature. Such systems are analysed here in general terms with emphasis on design of the optics. The general principle is the creation of an intermediate mirror image which remains stationary during the exposure of each frame and the commutation of a light beam from one lens to the next in an array of small lenses. In a practical device, the object produces an image through an objective and a collector lens at a rotating mirror which turns the image around so that an array of lenses placed along a circular arc is illuminated successively and produces successive images along a film strip concentric with the array. The transfer of the image

S/077/60/005/003/004/009
E191/E481

Image Shift in Slow Motion Devices with Image Commutation

from one lens to another acts as an optical shutter device. The rotating mirror is in fact usually part of a mirror prism and its centre is not in the centre of the array. The error introduced by the distance between the mirror axis of rotation and the centre of the array is examined. The effect of the resulting shift between the centre of the intermediate image and the centre of the array on the quality of the image is investigated analytically. This effect is substantial and the choice of the above distance is one of the important design parameters of the device. The image shift and its effect on the resolving capacity of the optical system in the slow motion camera is found to be the larger, the greater the aperture ratio of the system, the larger the distance of the reflecting surface of the mirror from the axis of rotation and the larger the total sweep angle of the camera. On the other hand, the shift of the image in depth does not affect the quality of the photographic image. The image shift during exposure of a frame is proportional to the aperture ratio of the camera and in a large measure is determined by the distance of the reflecting

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S/077/60/005/003/004/009
E191/E481

Image Shift in Slow Motion Devices with Image Commutation

surface from its axis of rotation. The image shift with a constant aperture ratio is proportional to the size of the intermediate image (size of the mirror). There are 9 figures, 1 table and 7 references: 5 Soviet and 2 English.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR
(Institute of Chemical Physics AS USSR)

SUBMITTED: August 1, 1959

Card 3/3

85333

23,5000

S/120/60/000/005/001/031
E191/E381

AUTHORS: Shnirman, G.L. and Dubovik, A.S.

TITLE: Modern High-speed Photography (Review)

PERIODICAL: Pribory i tekhnika eksperimenta, 1960, No. 5, pp. 3 - 15

TEXT: After listing the typical uses of high-speed photography, including some major military applications, the international exchange of experience through the medium of international conferences is mentioned and two All-Union conferences in 1957 and 1960 are referred to. Electronic methods for carrying out auxiliary operations and for the instantaneous generation of an intermediate image in the fastest photographic devices are characteristic of modern trends. Electronic control ensures the sequence of operations to an accuracy of fractions of a microsecond. Electronic optical transducers have opened new ways of greatly raising the speed of photography just when mechanical means of optical control approach the limit of their potentialities. The well-known system is explained in principle wherein an image is made to move together with a continuously moving film. For example,

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S/120/60/000/005/001/051
E191/E381

Modern High-speed Cinematography (Review)

the image can be moved by means of a rotating prism. Although not new, the commercial production of this type of apparatus suitable for speeds of the order of 10 000 frames/sec is increasing. The Russian version of such a camera is designated СКС-1 (SKS-1).[24] American and Swiss makes are mentioned. Speeds of 10 000 frames/sec in 8 mm film are achieved. Special arrangements are mentioned such as simultaneous oscillographic recording, attachments for microphotography and special cameras to withstand up to 100 g. The limiting speed of a film due to centrifugal stresses is 100-120 m/sec. Greater speeds are reached by rolling off inside a drum permitting up to 400 m/sec. Compared with a total length of film in coiling arrangements which reaches up to 300 m, films in or on drums rarely exceed 1.5 m length, thereby severely limiting the duration of the photographed event. Usually, the important part of the event can nevertheless be captured. When the brightness of the photographed phenomenon is of the same order as that of other objects in the field of view or else the total duration of the luminous

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phenomenon exceeds the duration of one turn of the drum, high-speed shutters synchronised with the phenomenon are necessary. The German Fruengel "Strobodrum" uses a powerful pulse projector with 16-50 000 discharges per second each of 0.5 millisecond duration having a candle power of 2.5×10^8 and ensuring clear photography on standard 35 mm film moving at 100 m/sec without any devices for rendering the image stationary. The shift of the image is lower than the resolution of the optical system. Up to 5 000 frames/sec can be taken or, with correspondingly reduced frame height, up to 50 000 frames/sec.

The Cranz-Schardin principle of high-speed photography uses a number of parallel focusing systems, each creating an image in its own region of the sensitised material. German apparatus of this type has a thyratron controlled spark gap for each focusing channel with a switching accuracy of 0.1 μs. The Russian ЭФП-36 (FP-36) camera of the Gosudarstvennyy opticheskiy institut (State Optical Institute) uses parallel

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focusing systems for self-illuminating phenomena. A disc-type slot shutter controls the sequence of light admission to the separate focusing systems, producing a sequence of images on a broad (320 mm) moving film. During exposure of all frames, the film moves by one frame height and thus blurring is negligible. 25 000 frames/sec are obtained at a relatively low film winding speed. Up to 9 seconds total exposure time are available. The multi-row arrangement of frames accelerates the process but is not suitable for objects in close proximity because of substantial parallax. This drawback is absent in arrangements with optical commutation by a rotating mirror which throws the image onto a row of intermediate objective lenses arranged alongside stationary sensitised material. To eliminate the "vignette" effect, a collector lens is so arranged between the entry objective lens and the rotating mirror that the entry objective lens and the intermediate objective lenses are placed at the conjugate focal points of the collector lens. This arrangement assures true step-by-step commutation. The ЖСФР (SFR) camera permits 625 000 frames/sec of 10 x 10 mm and

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2.5 million frames/sec of 5 x 5 mm with total numbers of 60 and 240 frames, respectively. A thyratron discharge device emits a high voltage impulse which triggers the phenomenon to be photographed at a certain position of the rotating mirror. The flat two-sided mirror rotates at 75 000 rpm, driven by a commutator AC motor through a speeding-up gear. Further increases in speed by lengthening the optical lever are impractical without loss of resolution. Increasing the mirror speed is adopted by American instruments with the help of air, or even helium, turbines. In a recent Brixner camera the helium turbine rotates a mirror in vacuo at 1.26 million rpm and achieves 15 million frames/sec. Among instruments of this kind without exact synchronisation between the beginning of the photographed phenomenon and the angular position of the rotating mirror, the ФП-22 (FP-22) camera of the State Optical Institute has a maximum rate of 100 000 frames/sec and a total duration of 0.08 sec. The mirror set at 45° to the optical axis and the entry objective lens perform axial motion, apart from rotation about the optical axis and thereby cover with 3.6 x 4.8 mm frames

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a 16 mm film disposed around the optical axis in a large diameter spiral. A dove prism ahead of the entry objective lens rotates at half the mirror speed against the direction of rotation of the mirror and so compensates the turning of the images about the centres of the frames. The film can be projected on a screen reproducing the phenomenon in slow motion at a speed reduced 6 250 times. The rotating mirror is set at 45° to the axis of rotation. The speed of photography is, other things being equal, half that of instruments in which the axis of rotation of the mirror is perpendicular to the optical axis. Devices with optical commutation of the "waiting" type have a large variety of optical and mechanical arrangements. The common feature is the existence of two, three or four simultaneously operating photographic devices with optical commutation so laid out that before completion of the photographing process in the first channel, photographing begins in the second channel. The "dead" angle of the mirror rotation within which, in the given channel, no images are produced on the sensitised material is overlapped by the operation of

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neighbouring channels. In most cases, to avoid parallax, a common entry objective lens is used and the light is divided by semitransparent mirrors and directed into each channel. The light intensity is thereby reduced. The Beckman and Wheatley camera is mentioned, yielding 1.4 million frames/sec of 17 x 25 mm and a total number of 80 frames. Combination of optical commutation with the Kerr shutter ensures an exposure time of 50 mμs to avoid blurring of fast moving phenomena. In a Russian instrument devised at the Physical Chemistry Institute of the AS USSR the reduction in the exposure time is achieved by increasing the effective aperture of the recording system. The objective lens produces an image of the object near a four-sided prism. Simultaneously the same objective lens produces the image of an aperture diaphragm by reflection from the prism along an axis at right-angles to the axis of the objective lens. The diaphragm image is placed in front of a reversing system of lenses which transfers the image of the object to a film placed on a rotating drum. The drum and the four-sided mirror prism are kinematically so

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inter-connected that when the sides of the prism change over, the film displaces by one frame width. Insofar as the intermediate range does not coincide with the point of reflection in the mirror, the image is displaced by a certain amount corresponding to the displacement of the film during the same time interval. The recording frequency of the camera is 2 500 frames/sec with a 20 mm frame. The effective aperture equals 40 so that the exposure time is reduced to 10 millionths of a second and corresponds to a recording frequency of 100 000 frames/sec. The "Dynafax" camera of Beckman and Wheatley can record up to 25 000 frames/sec with exposures up to 1 millionth second and has a frame size of 7.5x10 mm. The film is on the inside of the rotating drum. Slow-motion devices with commutation of the image built on classical principles but having some improvements in design were shown at the Fourth International Congress by A. Skinner and T. Rankvist of Sweden. The present authors, together with Kevlishvili, have developed a method of increasing the recording frequency up to 30 million frames/sec. Multiple mirror reflection in a system

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with image commutation is used in the ЛГВ-1 (LV-1) camera constructed at the Physical Chemistry Institute of the AS USSR. After traversing the objective lens and a collector lens, the light from the photographed object is reflected through two mirrors reversing its direction and enters a reversing system of lenses. The light which emerges from the system is once again reflected by a mirror at right-angles and, after a collector lens, an intermediate image of the object is produced in the region of two rotating mirrors. The mirrors rotate in opposite directions which causes the pencil of light to be reflected ten times. The speed of rotation of the pencil is twice the product of the number of reflections and the speed of rotation of the mirror. The finally reflected pencil is transmitted by a row of lenses to the film surface on the inside of a cylindrical guide surface. The same collector lens produces the image of an aperture diaphragm placed between the two lenses of the reversing system in the region of the final row of lenses. This image, in the course of its motion, performs the function of commutation.

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An automatic electronic device emits the starting impulse for the phenomenon to be photographed when the required speed of the camera is achieved. An explosive type shutter shuts off the light. The frequency range extends from 2 million to 33 million frames/sec. Either 30 or 150 frame cameras of 12 or 5 mm are available. Reducing the frame width in the direction of unrolling to a small size leads to slot recording of fast processes. Such photo-recorders ensure a high resolution in time. Sometimes, the recording method serves to measure the speed of the process. The SFR instrument permits, apart from frame-by-frame recording, also continuous recording with slot unrolling with a time resolution down to 0.02 μs (unrolling speed of 5.4 km/sec. A more recent variant, ЖФР-1 (ZhFR-1), has been developed at the Physical Chemistry Institute. A twin objective lens system has an intermediate slot. The image is unrolled along the film by means of a multi-sided mirror prism. The device has an electromagnetic shutter and a high-speed explosive shutter. A dwell type photo-recorder for medium speeds of unrolling, designated ЖФР-2 (ZhFR-2), was

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also built at the institute for the study of gas-mixture detonations. With unrolling speeds of 50-4000 m/sec it has a synchronous motor drive. The principle of the grating type camera is discussed, leading to the decisive improvement by I.S. Courtney-Pratt who used a crossed grating with cylindrical lenses. The most advanced grating cameras are those having a fine structure grating with spherical lenses. Such gratings have been developed by the NIKFI. These were used for a high-speed grating camera PK(-1 (RKS-1) which ensures a frequency of up to 100 million frames/sec. An objective lens produces an image of the photographed object in the plane of a grating with spherical lenses which produces in a plane at a small distance behind it a grating image of the object. An intermediate objective produces an image of this plane on the photographic plate. The grating image is displaced by two mirrors rotating in opposite direction at 10 000 rpm. The photographic plate, after development, is re-positioned in the apparatus for decoding by means of an illuminator behind a diaphragm itself behind a frosted glass. A hinged mirror

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directs the light from the diaphragm into the optical system of the camera. The diaphragm exactly replaces the objective pupil. The rotating mirrors are stopped and displacement of the image is performed instead by moving the photographic plate frame. A synchronising device for the position of the image and the initial instant of the photographed phenomenon is provided. The fine structure grating of spherical lenses was greatly admired at the Fourth International Congress. Among the earliest electrical methods of high-speed photography is the use of a set of cameras by means of high-speed Kerr shutters working in sequence. Several frames with an interval of 1-2 μs each can be obtained. Pulse photography in the USSR possesses lamps with energies between 0.2 and 15 000 Joules. In Western Germany, as mentioned earlier, pulse-discharge lamps are sold together with the photographic equipment. These are capable of high pulse frequencies up to 140 000/second. Pulse lengths down to 0.01 μs have been obtained by H.E. Edgerton. X-ray high-speed photography, first introduced by Kingdom and Tenis was applied

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most recent work includes the development of X-ray pulse tubes of up to 1-2 MV. X-ray discharges of 0.2 ms have been obtained in an installation permitting eight frames. In Germany, soft X-ray radiation (up to 50 kV) high-speed devices have been developed. G. Thomer and A. Stenzel have described an installation for up to 60 frames with pulse times under 0.1 ms at frequencies up to 5000 frames/sec. The main contribution of electronics is the development of electron-optical transducers. In the USSR the photography of elementary particles was the first use of electron-optical transducers. Theoretical work has shown the possibility of time resolution down to 10^{-13} sec. The latest work concerns the development of non-cascade transducers, ПИМ-3 (PIM-3) and ПИМ-4 (PIM-4), and also multi-cascade devices permitting amplification of brightness by several orders. An electron-optical slow motion device has been described by Russian authors permitting frequencies up to 60 million frames/sec (2.5 x 3 cm).

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Electron-optical transducers can also be used as high-speed light shutters in conjunction with optical-mechanical devices. Electron-optical transducers do not yet ensure a sufficiently high optical resolution, particularly in systems with image intensification. There are 15 figures and 37 references: 21 Soviet, 13 English and 3 German.

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